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STRUCTURAL LOADS SURVEY DURING  
COLD-WEATHER OPERATIONS

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Technology, Incorporated

Prepared for:

Army Air Mobility Research and Development  
Laboratory

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The trend revealed in this investigation - a dramatic increase in loads and moments resulting from the compressibility effects of main and tail rotor performance in the dense Arctic atmosphere - indicates that further data acquisition is warranted to substantiate these findings and that future helicopter design documents should reflect the effects of extreme cold-weather operations on critical flight dynamic components.

This report has been reviewed by the Eustis Directorate and is considered to be technically sound.

The technical monitor for this contract was Mr. W. T. Alexander, Jr., of the Structures Technical Area, Technology Applications Division.

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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br><br>To determine the effects of cold weather on the loads of dynamic components in the main and tail rotor systems of the UH-1H helicopter was the prime objective of the reported study. Accordingly, 18 hours of in-flight oscillograph data were recorded on these components while the helicopter flew at prescribed temperature-density altitude conditions in the arctic environment of Allen Army Airfield, Fort Greely, |                        |  |

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20. Alaska, during January and February of 1974. Equipped with strain gages, the instrumented components were the main and tail rotor blades, drag brace, scissors link, collective and cyclic boost tubes, and tail rotor shaft. Although extreme temperature inversions along with the priority of flying at temperatures close to -25°F resulted in loads recorded at negative density altitudes, the temperature-density altitude combinations in the data sample were representative of helicopter operation in the arctic environment. The loads proved to be a function of the local Mach number of the airfoil section of the main and tail rotor blades. In addition, the comparison of the current cold-weather data and previous warm-weather data recorded on a UH-1D equipped with the same type of main rotor blade indicated that higher loads were experienced during the cold-weather operation.

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## PREFACE

Technology Incorporated, Dayton, Ohio, prepared this report to document a program to collect, process, and analyze loads recorded on various dynamic components in the main and tail rotor systems of the UH-1H helicopter operating under extreme cold-weather conditions in the arctic environment. This program was sponsored by the Eustis Directorate, U. S. Army Air Mobility Research and Development Laboratory, Fort Eustis, Virginia, under Contract DAAJ02-74-C-0006. The program extended from September 1973 to September 1974. The Project Monitor for the Army was Mr. William Alexander.

Technology Incorporated personnel active in this program were Mr. Thomas A. Torres, Project Engineer, who directed the project and off-site flight test work; Mr. Terry Cox, who participated as flight test engineer and directed the data processing; Mr. Henry Pender, who directed the instrumentation of the recording system; and Mr. Raymond B. Johnson, Project Manager.

The authors acknowledge the support and contributions of Mr. Alexander and of the personnel at Allen Army Airfield, Fort Greely, Alaska, particularly the following: Major Lloyd Morgan, Commander; Colonel Bruce Young, TECOM advisor; Captain Don Stark and Lieutenant Larry Crosson, test pilots; SP/5 Morris Talley, crew chief; and SP/4 Mike Hall, crewmember.

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## 1. INTRODUCTION

For the continued study of dynamic component loads on Army helicopters, an operational strain survey was conducted on a UH-1H helicopter stationed at Fort Greely, Alaska, during January and February of 1974. During this period approximately 24 hours of flight data were recorded by an oscillograph recording system. Of these hours, 18 were recorded during engineering flight tests and 6 during pilot and recording system checkout flights. The flight tests were designed primarily to monitor various dynamic components in both the main and the tail rotor systems under specific flight conditions.

This report (1) describes the oscillograph recording system to measure the strains on the various dynamic components, (2) outlines the helicopter test configurations, (3) describes the test procedures for each flight condition, (4) defines the recorded and computed parameters, (5) explains the data processing techniques, and (6) presents and analyzes the processed data. Appendix C presents graphs of component loads as a function of airspeed and rotor tip Mach number. Appendix D presents in tabular form all data processed during this program.

The program objectives were accomplished by (1) instrumenting and calibrating the dynamic components, (2) recording flight loads for various gross weight, center-of-gravity, altitude, and temperature combinations, (3) processing the recorded data for maximum oscillatory loads for each flight condition, and (4) comparing these cold-weather data with warm-weather data collected on the same type of aircraft, a UH-1D, to determine temperature effects.



## 2. INSTRUMENTATION

### 2.1 General

To obtain the flight loads data, two oscillograph recorders, a signal conditioning unit, two slip rings, and numerous pressure transducers and strain gages were installed in the test helicopter. Since the major components and transducers are detailed in Reference 1, they are only briefly described in the following paragraphs.

### 2.2 Oscillograph Recorders

Two Consolidated Electrodynamics Corporation Model 5-114 P3-18 oscillograph recorders were used to record the in-flight data. Each recorder has 18 data and 4 reference channels. Since the flight test was conducted in an extremely cold environment, heaters were installed in the oscillograph recorders and the signal conditioning unit to maintain a constant temperature as well as to protect the electronic equipment.

### 2.3 Signal Conditioning Unit

To convert the strain gage and pressure transducer output into useful oscillograph input, a signal conditioning unit was fabricated with the capability of conditioning the inputs to 36 data channels and of amplifying the inputs to 26 of these channels. Each conditioning circuit in the unit was mounted on a separate printed circuit board which was easily accessible for repairs or modifications. Calibration and zero switches for each data channel were installed on the front of the signal conditioning unit.

The acquisition of the strain data from the rotating components required the installation of two slip-ring assemblies: a main rotor slip-ring assembly consisting of 30 rings in a cylindrical configuration and a tail rotor slip-ring assembly consisting of 18 rings.

### 2.4 Transducers

Pressure transducers, namely, the Statham Model PL96TC-.5-350 unidirectional, differential pressure transducer, the Statham Model P69-15A-350 absolute pressure transducer, and the Viatran Model PTB-103 differential pressure transducer, were used to sense airspeed, altitude, and engine torque, respectively.

Accelerometers were used to sense the helicopter's longitudinal, lateral, and vertical center-of-gravity accelerations.

Statham Model A3-1.5-350 accelerometers were used to sense longitudinal and lateral accelerations, and a Statham Model A3-5-350 accelerometer was used to sense vertical accelerations.

Connected by special actuators to the control linkages beneath the cargo floor, Markite Model 2094 infinite-resolution potentiometers were used to sense the lateral and longitudinal cyclic stick positions, the collective stick position, and the rudder position.

The outside air temperature was monitored by a Minco Model 5-6B thermal ribbon. The ribbon was attached to, but insulated from, the skin of the aircraft beneath the cargo floor.

To monitor the main rotor's rotational speed, a special circuit was designed and fabricated. This circuit sensed the aircraft's rotor tachometer-generator and yielded a frequency as an input to control an oscillator circuit. The resultant oscillator output controlled a gate which varied the voltage of a DC circuit between +5 VDC and ground. This voltage was then filtered and reduced to a pure DC signal acceptable to the oscillograph recorder.

In addition, the main rotor azimuth detector was used to monitor rotor speed as well as azimuth position. An Electro Model 3020 AN magnetic pickup was used to sense the azimuth position. By mounting the pickup to a stationary member of the aircraft and attaching a ferrous probe to a rotating member, the resultant signal was a "spike" per rotor revolution which permitted the determination of rotor speed and position.

### 3. HELICOPTER TEST CONFIGURATIONS

#### 3.1 General

As listed in Table 1, the flight test plan called for eight combinations of gross weight, c.g. position, and density altitude conditions. In each of these combinations, the gross weight was 8500 or 9500 pounds; the c.g. position was forward or aft; and the density altitude was 1000 or 3000 feet. With consideration for the instrumentation package as well as the basic aircraft configuration, the helicopter was modified to effect the two c.g. positions.

| TABLE 1. AIRCRAFT-DENSITY ALTITUDE TEST CONFIGURATIONS |           |                      |
|--|-----------|----------------------|
| AIRCRAFT LOADING                                       |           | TEST ALTITUDE        |
| <u>GW</u>  | <u>CG</u> | <u>H<sub>D</sub></u> |
| 8500   | FWD       | 1000                 |
| 8500   | AFT       | 1000                 |
| 8500   | FWD       | 3000                 |
| 8500   | AFT       | 3000                 |
| 9500   | FWD       | 1000                 |
| 9500   | AFT       | 1000                 |
| 9500   | FWD       | 3000                 |
| 9500   | AFT       | 3000                 |

#### 3.2 Gross Weight and C.G. Determination

The calculations for the gross weight and c.g. position of the test helicopter were based on pertinent information logged on two types of Air Force forms: (1) DD Form 365C, the Basic Weight and Balance Record, and (2) Weight and Balance Clearance Form F; Appendix A shows samples of information logged on the latter form. Fuel weight, passenger location, and auxiliary fuel tank data were obtained from Reference 2. Table 2 lists the gross weight, location, and moment for each major item in the instrumentation package.

| TABLE 2. WEIGHT AND LOCATION OF INSTRUMENTATION |               |                 |               |
|---|---------------|-----------------|---------------|
| <u>EQUIPMENT</u>                                | <u>WEIGHT</u> | <u>LOCATION</u> | <u>MOMENT</u> |
| Tail Rotor Slip-Ring Installation               | 2.3           | 479.4           | 1102.6        |
| Oscillograph and Mounting                       | 202.0         | 112.0           | 22624.0       |
| Main Rotor Slip-Ring Installation               | 22.0          | 133.5           | 2937.0        |
| Signal Conditioning Unit                        | 15.0          | 112.0           | 1680.0        |
| Engine Torque Transducer                        | 4.2           | 168.0           | 705.6         |
| Accelerometers                                  | 1.5           | 133.5           | 200.3         |
| Airspeed, Altitude Transducers                  | 3.0           | 6.0             | 18.0          |
| Control Position Transducers                    | 1.5           | 87.5            | 131.3         |
| Tail Rotor Wiring Bundle                        | 15.6          | 346.0           | 5397.6        |
| Miscellaneous Equipment                         | 10.0          | 112.0           | 1120.0        |
| TOTAL   | 277.1         |                 | 35916.4       |

Table 3 lists the modifications to the aircraft configuration to effect the forward and aft c.g. positions for the two gross weight conditions prescribed in Table 1.

| TABLE 3. AIRCRAFT MODIFICATIONS TO ACHIEVE VARIOUS GROSS WEIGHT-C.G. POSITION CONFIGURATIONS |                      |  |
|--|----------------------|--|
| <u>GROSS WEIGHT</u>  | <u>C.G. LOCATION</u> | <u>SPECIAL PROVISIONS</u>  |
| 8500   | AFT<br>(144)         | Battery in aft compartment<br>Survival equipment at STA. 151<br>Aux. tank installed, 60 gallons<br>Ballast, 100 lb at STA. 120<br>Ballast, 50 lb at STA. 233<br>Three crewmembers  |
| 8500   | FWD<br>(134)         | Battery in forward compartment<br>Survival equipment at STA. 85<br>Aux. tank installed, 0 gallons<br>Ballast, 50 lb at STA. -2<br>Ballast, 127 lb at STA. 46.7<br>Ballast, 170 lb at STA. 65<br>Ballast, 50 lb at STA. 5<br>Four crewmembers   |
| 9500   | AFT<br>(143)         | Battery in aft compartment<br>Survival equipment at STA. 151<br>Aux. tank installed, 150 gallons<br>Ballast, 125 lb at STA. 100<br>Ballast, 50 lb at STA. 233<br>Four crewmembers  |
| 9500   | FWD<br>(136)         | Battery in forward compartment<br>Survival equipment at STA. 85<br>Aux. tank installed, 130 gallons<br>Ballast, 50 lb at STA. -2<br>Ballast, 127 lb at STA. 46.7<br>Ballast, 170 lb at STA. 65<br>Ballast, 50 lb at STA. 5<br>Four crewmembers |

### 3.3 Density Altitude and Temperature Requirements

In addition to the prescribed density altitudes of 1000 and 3000 feet, the flight test plan called for the recording of data at temperatures below -25°F. To reach a density altitude of 1000 feet at -25°F would have normally required flying at a pressure altitude of about 5500 feet. However, extreme temperature inversions frequently precluded attaining the prescribed temperatures at the higher pressure altitudes. Consequently, the helicopter was often flown at low pressure

altitudes, as shown in Figure 1. As a result, the in-flight data were recorded at density altitudes ranging from -2900 to 3400 feet. Nevertheless, the data are representative of the temperatures, altitudes, and component loads of helicopters operating in the arctic environment.

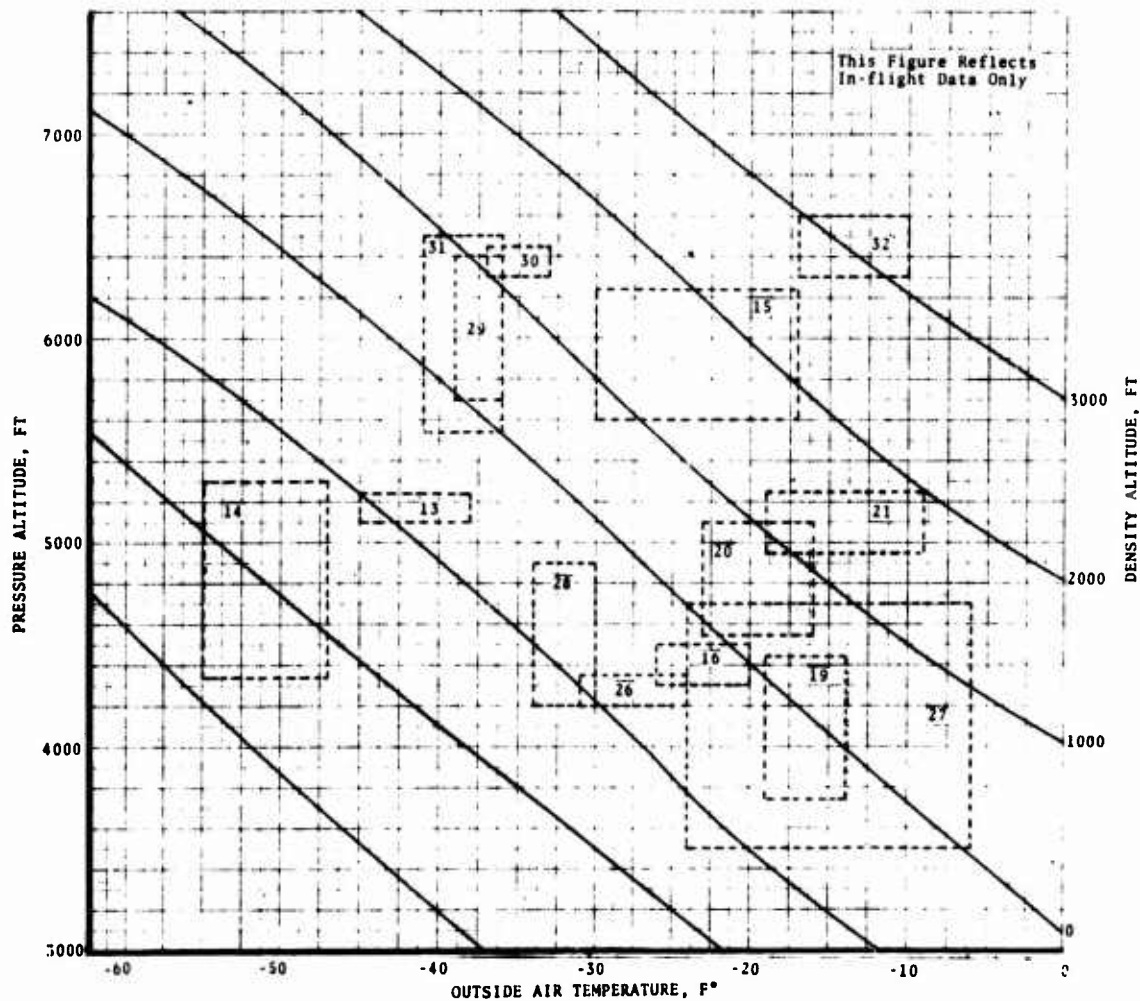


Figure 1. Density Altitude-Temperature Combinations by Flight.

## 4. TEST PROCEDURES

### 4.1 General

To ensure the efficiency of the data collection and the accuracy and repeatability of the recorded data, the same procedures were used each flight to check the aircraft and instrumentation integrity, to conduct the various in-flight operations, and to review the postflight data. The following paragraphs explain the test procedures and identify the actual flight conditions investigated during the flight test.

### 4.2 Procedures

Before each flight, the aircraft and instrumentation system were inspected to verify the aircraft and system integrity. In addition to the test configuration-density altitude combinations listed in Table 1, each flight was performed according to one of the two sets of flight conditions listed in Tables 4 and 5. These operations, however, were occasionally modified because of weather conditions, aircraft instability, or malfunctioning equipment. During each flight, the observer requested various pressure altitude and indicated airspeed combinations. The values requested for pressure altitude and indicated airspeed were adjusted to compensate for instrument errors and temperature effects. Before a flight condition was initiated, the aircraft was stabilized and the recording system was activated.

After the aircraft landed, the oscillograph channels were recalibrated. Then, after the oscillogram rolls were removed and processed, the oscillogram traces were reviewed to detect any equipment malfunctions, trace misplacements, and other anomalies so that remedial action could be taken before the next flight.

TABLE 4. FLIGHT PLAN 1

| TABLE 4. FLIGHT PLAN 1  |                     |                     |                     |                     |
|---|---------------------|---------------------|---------------------|---------------------|
| Flight Conditions   | IAS                 |                     |                     |                     |
|   | 8500 lb             |                     | 9500 lb             |                     |
|   | 1000'H <sub>D</sub> | 3000'H <sub>D</sub> | 1000'H <sub>D</sub> | 3000'H <sub>D</sub> |
|   | V <sub>h</sub> =115 | V <sub>h</sub> =112 | V <sub>h</sub> =110 | V <sub>h</sub> =107 |
| Flat Pitch: RPM Check<br>250, 309, 314, 324   |                     |                     |                     |                     |
| Hover IGE 309, 324 RPM  |                     |                     |                     |                     |
| Left Hovering Turn, 324 RPM   |                     |                     |                     |                     |
| Right Hovering Turn, 324 RPM  |                     |                     |                     |                     |
| Vertical Takeoff  |                     |                     |                     |                     |
| Hover to Full Power Climb   | 65                  | 65                  | 65                  | 65                  |
| Full Power Climb  | 65                  | 65                  | 65                  | 65                  |
| Level Flight, 50% V <sub>h</sub>  | 59                  | --                  | --                  | --                  |
| 60% V <sub>h</sub>  | 71                  | 67                  | 68                  | 66                  |
| Left Turn, 60% V <sub>h</sub>   | 71                  |                     |                     |                     |
| Right Turn, " "   |                     |                     |                     |                     |
| Cyclic Pull-up, " "   |                     |                     |                     |                     |
| Coll. Pull-up, " "  |                     |                     |                     |                     |
| Left Sideslip " "   |                     |                     |                     |                     |
| Right Sideslip " "  |                     |                     |                     |                     |
| "S" turn, 60% V <sub>h</sub>  | 71                  | 67                  | 68                  | 66                  |
| Level Flight, 70% V <sub>h</sub>  | 84                  | 82                  | 80                  | 78                  |
| Level Flight, 80% V <sub>h</sub>  | 95                  | 93                  | 91                  | 89                  |
| Level Flight, 90% V <sub>h</sub>  | 107                 | 104                 | 103                 | 100                 |
| Left Turn, " "  |                     |                     |                     |                     |
| Right Turn, " "   |                     |                     |                     |                     |
| Cyclic Pull-up, " "   |                     |                     |                     |                     |
| Coll. Pull-up, 90% V <sub>h</sub>   | 107                 | 104                 | 103                 | 100                 |
| "S" Turn, 90% V <sub>h</sub>  | 107                 | 104                 | 103                 | 100                 |
| Level Flight, 100% V <sub>h</sub>   | 119                 | 116                 | 113                 | 111                 |
| Partial Power Descent   | 65                  | 65                  | 65                  | 65                  |
| Approach and Landing  | --                  | --                  | --                  | --                  |
| Hover, 324 RPM  |                     |                     |                     |                     |
|   | Note 1              |                     | Note 2              |                     |
| Note 1: Terminate flight after 700 lb of fuel has been burned; start again with hover 324 RPM |                     |                     |                     |                     |
| Note 2: Terminate flight after 700 lb of fuel has been burned; start again with hover 324 RPM |                     |                     |                     |                     |

TABLE 5. FLIGHT PLAN 2

| TABLE 5. FLIGHT PLAN 2   |                     |                     |                     |                     |
|--|---------------------|---------------------|---------------------|---------------------|
| Flight Conditions  | IAS                 |                     |                     |                     |
|  | 8500 lb             |                     | 9500 lb             |                     |
|  | 1000'H <sub>D</sub> | 3000'H <sub>D</sub> | 1000'H <sub>D</sub> | 3000'H <sub>D</sub> |
|  | V <sub>h</sub> =115 | V <sub>h</sub> =112 | V <sub>h</sub> =110 | V <sub>h</sub> =107 |
| Rotor Start Normal   |                     |                     |                     |                     |
| Flat Pitch, 250, 324 RPM   |                     |                     |                     |                     |
| Hover IGE 309, 324 RPM   |                     |                     |                     |                     |
| Left Sideward Flight, 324 RPM  |                     |                     |                     |                     |
| Right Sideward Flight, 324 RPM   |                     |                     |                     |                     |
| Rearward Flight, 324 RPM   |                     |                     |                     |                     |
| Jump Takeoff   |                     |                     |                     |                     |
| Level Flight, 60% V <sub>h</sub>   | 71                  | 67                  | 68                  | 66                  |
| Power to Autorotation, 60% V <sub>h</sub>  | 71                  | 67                  | 68                  | 66                  |
| Autorotation to Power, 60% V <sub>h</sub>  | 71                  | 67                  | 68                  | 66                  |
| Level Flight, 90% V <sub>h</sub>   | 107                 | 104                 | 103                 | 100                 |
| Power to Autorotation, 90% V <sub>h</sub>  | 107                 | 104                 | 103                 | 100                 |
| Autorotation to Power, 90% V <sub>h</sub>  | 107                 | 104                 | 103                 | 100                 |
| Autorotation Landing with<br>Power Recovery, IGE   |                     |                     |                     |                     |
| Hover 324 RPM  |                     |                     |                     |                     |
| 309 RPM  |                     |                     |                     |                     |
|  | Note 1              |                     | Note 2              |                     |
| Note 1: Terminate flight after 700 lb of fuel has been burned; start again with hover 324 RPM. |                     |                     |                     |                     |
| Note 2: Terminate flight after 500 lb of fuel has been burned; start again with hover 324 RPM. |                     |                     |                     |                     |



## 5. DATA DEFINITIONS

### 5.1 General

As listed in Table 6, 29 in-flight parameters were recorded during each flight. In addition to the conversion of the analog recording of these parameters to engineering units, an additional three parameters were derived from computations involving both the oscillogram data and the supplemental data logged on special forms.

TABLE 6. IN-FLIGHT RECORDED PARAMETERS

| OSCILLOGRAPH 1 |                                 | OSCILLOGRAPH 2 |                                  |
|----------------|---------------------------------|----------------|----------------------------------|
| CHANNEL NO.    | PARAMETER                       | CHANNEL NO.    | PARAMETER                        |
| 1              | MR Chord Bndg. Moment, STA. 192 | 1              | TR Chord Bndg. Moment, STA. 11.0 |
| 2              | MR Beam Bndg. Moment, STA. 192  | 2              | TR Beam Bndg. Moment, STA. 11.0  |
| 3              | MR Chord Bndg. Moment, STA. 150 | 3              | TR Chord Bndg. Moment, STA. 21.5 |
| 4              | MR Beam Bndg. Moment, STA. 150  | 4              | TR Beam Bndg. Moment, STA. 21.5  |
| 5              | MR Beam Bndg. Moment, STA. 35   | 5              | TR Shaft Torque                  |
| 6              | Drag Brace Load                 | 6              | TR Azimuth                       |
| 7              | -                               | 7              | MR Azimuth                       |
| 8              | Scissors Link Load              | 8              | OAT                              |
| 9              | -                               | 9              | N <sub>x</sub>                   |
| 10             | -                               | 10             | N <sub>y</sub>                   |
| 11             | Long. Boost Tube Load           | 11             | N <sub>z</sub>                   |
| 12             | Lat. Boost Tube Load            | 12             | Rudder Pedal Position            |
| 13             | Coll. Boost Tube Load           | 13             | Rotor Speed                      |
| 14             | Coll. Stick Position            | 14             | Altitude                         |
| 15             | Long. Stick Position            | 15             | Airspeed                         |
| 16             | Lat. Stick Position             | 16             | Engine Torque                    |
| 17             | Voltage Monitor                 | 17             | Voltage Monitor                  |
| 18             | MR Azimuth                      | 18             |                                  |

### 5.2 Computed Parameters

The three computed parameters were density altitude, true airspeed, and rotor tip Mach number. The first two of these parameters were derived for each flight condition, and the third was calculated for various level-flight conditions when the azimuth of the instrumented rotor blade was 90 degrees. From Reference 3, the basic equation for the density altitude is

$$H_D = 145,300 \left[ 1 - \left( \frac{\rho}{\rho_0} \right)^{0.235} \right] \quad (1)$$

where  $H_D$  = density altitude, ft

$\rho$  = density at altitude, lb/ft<sup>3</sup>

$\rho_0$  = density at sea-level, standard-day conditions,  
lb/ft<sup>3</sup>

With the assumption that air is an ideal gas at sea level and at altitude, the density altitude may be expressed in terms of pressure and temperature by the ideal gas equation of state. Therefore, by substituting the pressure and temperature constants for sea-level, standard-day conditions, Equation (1) becomes

$$H_D = 145,300 \left[ 1 - \left( \frac{17.326P}{T+460} \right)^{0.235} \right] \quad (2)$$

where  $P$  = pressure at altitude, inches of mercury

$T$  = temperature at altitude, °F

The recorded indicated airspeed was corrected to calibrated airspeed (CAS). From Reference 4, the basic equation for true airspeed is

$$TAS = CAS \left( \frac{\rho}{\rho_0} \right)^{0.5} \quad (3)$$

where  $TAS$  = true airspeed, knots

$CAS$  = calibrated airspeed, knots

$\rho$  = density of air at altitude, lb/ft<sup>3</sup>

$\rho_0$  = density of air at sea-level, standard-day  
conditions, lb/ft<sup>3</sup>

Again, with the assumptions and substitutions applied to Equation (1), Equation (3) becomes

$$TAS = 4.16 CAS \left( \frac{P}{T+460} \right)^{0.5} \quad (4)$$

where  $P$  = pressure at altitude, inches of mercury

$T$  = temperature at altitude, °F

To compute the rotor tip Mach number, which was used to investigate temperature effects on component loads, the pertinent oscillogram data were substituted in Equations (5) and (6):

$$V = V_R + V_{A/C} \quad (5)$$

where  $V$  = velocity at the tip of the instrumented rotor blade at a 90° azimuth, ft/sec

$V_R$  = rotational velocity of the tip of the rotor blade, ft/sec

$V_{A/C}$  = velocity of the aircraft, ft/sec

$$M = \frac{V}{a} \quad (6)$$

where  $M$  = Mach number

$a$  = local speed of sound, ft/sec

## 6. DATA PROCESSING

### 6.1 Data Editing

To provide accurate and useful data, each oscillogram was initially reviewed to detect any evidence of equipment malfunctions and missing or indistinguishable traces. Whenever the data were judged to be invalid because of the extent of the apparent equipment malfunction, the oscillogram was not processed. However, if an oscillogram had some missing or indistinguishable traces but the others reflected valid data, the oscillogram was processed.

After this initial review, the traces were scanned to find the maximum oscillatory loads and moments during each specific flight condition. As illustrated in Figure 2, at each maximum oscillation, an envelope representing the double amplitude was drawn, and the mean point about which the trace tended to oscillate was marked. The mean value did not always fall midway between the double-amplitude envelope since the positive and negative peaks were not necessarily of the same amplitude.

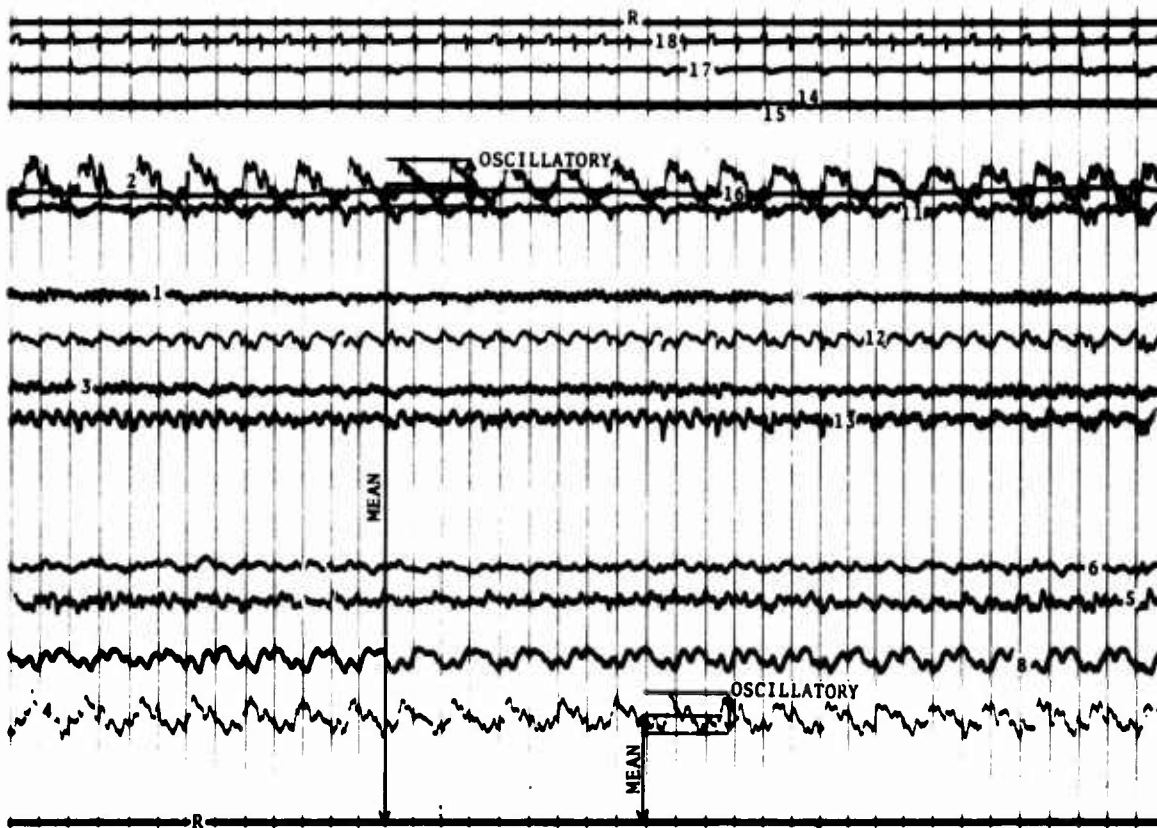


Figure 2. Sample Oscillogram Showing Data Editing Model.

## 6.2 Data Reading and Digitizing

In addition to the foregoing markings, all other traces in the area where most of the maximum oscillations occurred were manually measured from a common reference line.

## 6.3 Data Reading Quality Control

To define the reading accuracy, a random sample of oscillogram data was measured, and then these measurements were compared with the corresponding original measurements. The differences between the two measurements were then expressed in terms of engineering units to define the expected reading error. Any oscillograms whose measured data were outside the established reading error limits were reread. The reading error of the data recorded in each data channel during each flight is listed in Appendix M.

## 7. DATA PRESENTATION AND ANALYSIS

### 7.1 General

The following paragraphs (1) describe the data presentation methods, (2) present and analyze loadings for each helicopter dynamic component, (3) note significant trends, (4) compare the current loads data with those previously gathered under similar programs, and (5) detail the technique to make the chordwise loads and the temperature compensation independent in the bending gages on the tail and main rotor blades.

To investigate the effects of cold-weather operations on the loads of various dynamic helicopter components, the component loads in selected level-flight data were plotted against main rotor blade tip Mach number and airspeed; these figures are presented in Appendix C. On the basis of these figures, the tabular data in Appendix D, the Bell UH-1D fatigue life substantiation (Reference 5), and the UH-1D load level tests (Reference 6), the loads on each of the relevant dynamic helicopter components are discussed in the following paragraphs.

### 7.2 Main Rotor Blade

As indicated in Figures C-25, C-27, and C-29, the beamwise and chordwise oscillatory moments of the main rotor blade increased greatly as the main rotor tip Mach number increased. The high main rotor tip Mach numbers were a direct result of the extremely cold environment. These figures also indicate that the oscillatory moments in the cold-weather (-25°F) data were much higher than those in Bell Helicopter's warm-weather (68°F) data, which were collected on a UH-1D equipped with the same rotor blade as on a UH-1H. The UH-1D had a gross weight and c.g. position similar to those for the UH-1H in the cold-weather tests.

For the cold-weather data, Figures C-1, C-2, C-3, and C-17 illustrate the oscillatory and mean beamwise bending moments versus the percentage of never-to-exceed velocity ( $\% V_N$ ) for the main rotor blade. As apparent, the oscillatory moment increased with airspeed, whereas the mean moment remained relatively constant.

The warm-weather data in the fatigue substantiation report indicate that the largest oscillatory tensile stress occurred during an autorotation-to-power transition. This same trend appears in the tabular data of Appendix D. However, the cold-weather tests indicate that the loads during an autorotative landing approach with power recovery IGE can be twice as large as those recorded during a normal autorotation-to-power transition. Some of these loads approached oscillatory

levels of 90,000 in.-lb for chordwise bending at Station 192. Also, cyclic and collective pull-ups caused oscillatory loads greater than 50,000 in.-lb. The same trends appear in the data for the UH-1D load level tests, but the oscillatory levels are not as high as those in the cold-weather data. Apparently, therefore, the airspeed and maneuver type affect the dynamic load levels on the main rotor blade. However, the operating temperature affects the loads more since the compressibility effects become extremely critical as the temperature becomes lower.

### 7.3 Tail Rotor Blade

As with the main rotor blade, the beamwise and chordwise oscillatory moments of the tail rotor increased markedly as the tail rotor tip Mach number increased. Since the tail rotor tip Mach number is proportional to the main rotor tip Mach number ( $M_{TR} \approx 0.92 M_{MR}$ ), the moments are plotted versus main and tail rotor tip Mach numbers for reference purposes. For the tail rotor blade, Figures C-26 and C-28 show plots of oscillatory beamwise and chordwise moments versus Mach number, and Figures C-4 and C-5 present plots of mean and oscillatory beamwise moments versus airspeed.

Whereas the beamwise oscillatory moments at Station 11.0 in the cold-weather data are almost twice as large as those in the warm-weather data, those at Station 21.5 are approximately the same in both sets of data. This disparity could be due to one or more of the following: (1) the physical and mechanical properties of the blade, (2) the delta-hinged tail rotor system, and (3) the compressibility effects associated with high Mach number airflow.

The latter two possibilities appear to be most likely since they affect the blade loads. The delta-hinge allows the rotor blades to flap when the lift of one blade is higher than that of the other. This flapping imposes centrifugal force loads perpendicular to the blade; as a result, the loads on the advancing blade decrease while those on the retreating blade increase. Consequently, the blade flaps until it reaches an angle where the loads are in a state of equilibrium.

The compressibility effects caused by the high Mach numbers at the outboard stations of the blade so affect the blade loads that some blade areas produce less lift than normal because of the adverse results of the compressibility effects on the section lift coefficients of the blade, as shown in Figure 3. Since the strain gages only sense a moment equivalent to the total load outboard of their stations, the load distribution is unknown. Therefore, depending on the severity and location of the compressibility effects, the moments may vary drastically from station to station.

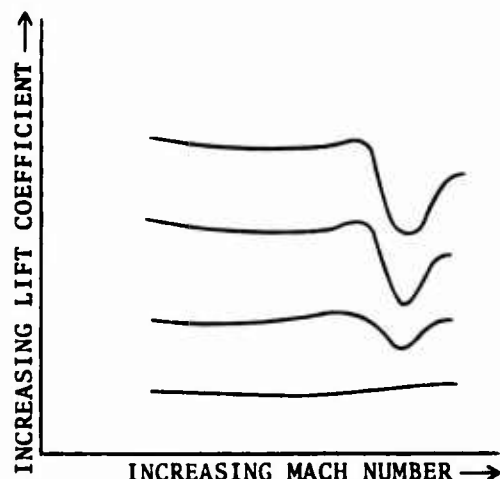


Figure 3. Compressibility Effects on Lift Coefficients.

In any event, since the fatigue life of the tail rotor blade is substantiated on the basis of the chordwise and beamwise oscillatory moments at Station 21.5, the stresses induced at this station by the cold-weather loads were investigated. The findings are as follows: The oscillatory stress levels for the trailing edge of the tail rotor blade in the cold-weather data agree closely with those in the warm-weather data. However, the high-speed turns in the cold-weather operation caused loads greater than those in the warm-weather operation. For example, an S-turn at  $0.9V_H$  in the cold-weather operation produced a chordwise moment of 1772 in.-lb and a beamwise moment of 1084 in.-lb. Inserting these values into an equation in the fatigue substantiation report (Reference 5) yields a stress of 5031 psi. This equation is as follows:

$$f_o = 0.178 M_c + 4.35 M_b \quad (7)$$

where  $f_o$  = maximum oscillatory stress at tail rotor Station 21.5, psi

$M_c$  = chordwise bending moment at tail rotor Station 21.5, in.-lb

$M_b$  = beamwise bending moment at tail rotor Station 21.5, in.-lb

The 5031-psi stress is nearly 34 percent higher than the maximum stress of 3759 psi recorded during a collective pull-up at  $0.9V_H$  in the fatigue substantiation program.



#### 7.4 Drag Brace

For the cold-weather data, Figures C-6, C-12, and C-19 indicate that the mean compressive load on the drag brace generally increased with increasing airspeed, while the oscillatory load increased slightly. These trends are directly related to the increasing main rotor blade lift and drag forces associated with increasing airspeed. The increase in these forces increases the chordwise and beamwise moments, which, in turn, increase the drag brace loads.

As stated in the fatigue substantiation report, collective pull-ups produced the highest oscillatory load on the drag brace, namely, 12,815 pounds. This load was recorded when the aircraft flew at a 2000-ft density altitude with an 8500-lb gross weight and a forward c.g. position. The Alaskan cold-weather data revealed that cyclic pull-ups and autorotations with power recovery IGE caused oscillatory loads of about 10,000 pounds. In general, the oscillatory loads in the cold-weather data are in the same range as those in the warm-weather data.

The warm-weather data list a maximum oscillatory load of 9900 pounds on the drag brace during a collective pull-up. However, during autorotations, the oscillatory levels remained nearly the same as those during power-on flight, which is in contrast to the levels in the cold-weather data. These differences were possibly due to pilot technique or Mach number effects on the main rotor blade which caused very large oscillatory loads on the drag brace during cold-weather operations.

#### 7.5 Scissors Link

In Figures C-7, C-13, and C-20, mean and oscillatory axial loads on the scissors link are plotted against airspeed. As evident, the oscillatory load levels increased as airspeed increased. Also, the oscillatory loads for a 9500-lb aircraft are approximately twice as large as those for an 8500-lb aircraft.

In comparison with the mean and the oscillatory loads in the warm-weather data, those in the cold-weather data are slightly larger and approximately 2 to 3 times larger, respectively. However, the trends of the two sets of data are quite similar. For both sets of data, the oscillatory levels are highest for high-speed turns and pull-ups. Since the loads in the warm-weather data are not as large as those in the cold-weather data, the fatigue damage calculated for the UH-1D may not be as large as it should be. In any event, the number of damaging flight condition occurrences in the cold-

weather data should be determined before the respective damage fractions are compared.

## 7.6 Collective and Cyclic Boost Tubes

The boost tube loads data recorded on a UH-1H operating in Southeast Asia (SEA) (Reference 7) are not in the same format as the cold-weather tabular data of Appendix D. Therefore, Tables 7 and 8 were prepared to present both sets of data in a comparable format. As apparent from this table, the oscillatory loads in the cold-weather environment were significantly higher than those in SEA. This difference was likely due to the ambient flight conditions during the respective data recordings: whereas the conditions during the SEA data collection were high temperatures and positive density altitudes, those during the current data collection were low temperatures and negative density altitudes.

TABLE 7. WARM-WEATHER BOOST TUBE LOADS

| Flight Condition | A/S<br>kn | N <sub>R</sub><br>rpm | GW<br>lb | Lateral     |             |            | Longitudinal |             |            | Collective  |             |            |
|------------------|-----------|-----------------------|----------|-------------|-------------|------------|--------------|-------------|------------|-------------|-------------|------------|
|                  |           |                       |          | 1/Rev<br>lb | 2/Rev<br>lb | Mean<br>lb | 1/Rev<br>lb  | 2/Rev<br>lb | Mean<br>lb | 1/Rev<br>lb | 2/Rev<br>lb | Mean<br>lb |
| Autorotation     | 80        | 322                   | 6450     | 282         | 188         | -29        | 213          | 128         | 48         | 164         | --          | -157       |
|                  | 83        | 325                   | 6402     | 282         | 106         | -6         | 170          | 85          | 37         | 109         | 38          | -266       |
|                  | 81        | 325                   | 6364     | 117         | 75          | -41        | 106          | 64          | 37         | 55          | --          | -206       |
|                  | 85        | 321                   | 6305     | 188         | 94          | -76        | 128          | 64          | 59         | 120         | 53          | -194       |
|                  | 78        | 323                   | 6263     | 164         | 71          | 18         | 170          | 106         | -5         | 160         | 54          | 57         |
| Hover            | 0         | 322                   | 7322     | 142         | 95          | -53        | 97           | 65          | -16        | 27          | --          | -80        |
|                  | 0         | 322                   | 8785     | 95          | --          | -100       | 65           | --          | -5         | 13          | --          | -67        |

TABLE 8. COLD-WEATHER BOOST TUBE LOADS

| Flight Condition | A/S<br>kn | N <sub>R</sub><br>rpm | GW<br>lb | Flight<br>No. | Lateral |     | Longitudinal |     | Collective |     |
|------------------|-----------|-----------------------|----------|---------------|---------|-----|--------------|-----|------------|-----|
|                  |           |                       |          |               | Mean    | OSC | Mean         | OSC | Mean       | OSC |
| Autorotation     | 70        | 321                   | 8500     | 27            | 129     | 491 | 166          | 384 | 381        | 97  |
|                  | 80        | 314                   | 8500     | 26            | 51.72   | 413 | 169          | 377 | 415        | 213 |
|                  | 85        | 333                   | 9500     | 19            | 62.85   | 540 | 209          | 617 | 363        | 338 |
|                  | 77        | 329                   | 4500     | 28            | -204    | 382 | 12.4         | 419 | 373        | 243 |
| Hover            | 0         | 320                   | 8500     | 27            | 155     | 181 | 89           | 320 | 134        | 85  |
|                  | 0         | 309                   | 8500     | 27            | 181     | 284 | 102          | 269 | 70         | 70  |

## 7.7 Tail Rotor Shaft

Figures C-11 and C-18 present the tail rotor shaft torque versus airspeed during level flight. Figure C-11 indicates that the mean torque of the tail rotor shaft increased with airspeed, and the tabular data show that the mean torque levels were very high during hovers, but decreased upon reaching the forward airspeed.

As airspeed increased from near zero to forward level-flight conditions, the lift (antitorque) of the tail rotor blade increased because of the higher airflow velocity over the blade. Therefore, the blade pitch angle can be reduced and thus decrease the tail rotor shaft torque. However, as the airspeed increases beyond the initial level-flight airspeed, the benefits of increased airspeed are offset by the need for more engine power to propel the helicopter and consequently the need to increase the pitch angle of the rotor blade to keep the aircraft stabilized. This in turn increases the shaft torque. In addition, at low airspeeds, the engine power required to produce lift is high; at the intermediate airspeeds, the required engine power is less because of the benefits of increased airspeed and low fuselage drag; and at high airspeeds, the additional engine power required to overcome fuselage drag is high. Consequently, the shaft torque of the tail rotor fluctuates in response to the engine power requirements.

Such trends appear in the cold-weather data. However, the torque levels in the cold-weather data are higher than those in the warm-weather data. This is reasonable since the loads on the tail rotor blade in the cold weather were higher than those in the warm weather, and the tail rotor shaft torque reflects the lift and drag forces acting on the tail rotor blades.

It is difficult to compare the warm- and the cold-weather data with respect to stress since only torsion was recorded during the cold-weather survey and bending moment stresses as well as torsion are required to calculate tail rotor shaft stresses. However, as in the warm-weather survey, the highest torque levels in the cold-weather survey occurred during the power-to-autorotation transitions. In the fatigue substantiation study, the following equation was used to calculate the resultant stress in the tail rotor shaft:

$$f_e = [(1.64M_R)^2 + 3(3.63T)^2]^{1/2} \quad (8)$$

where  $f_e$  = maximum oscillatory stress, psi

$M_R$  = resultant bending moments, in.-lb

$T$  = tail rotor shaft torque, in.-lb

If  $M_R$  is assumed equal to zero, to be conservative, and  $T$  equals 4542 in.-lb, the oscillatory stress is  $\pm 28,557$  psi, which is above the endurance limit of  $\pm 22,900$  psi. This stress level is 66 percent higher than the 17,254 psi stress level used to substantiate the tail rotor shaft. The substantiation data is 25 percent lower than the endurance limit, whereas the cold-weather data is nearly 25 percent higher. Therefore, the loads on the tail rotor shaft should be investigated further (in the event helicopter cold-weather operations are to continue).

### 7.8 Aerodynamic Compressibility Effects

The following discusses factors contributing to changes in  $M/R$  and  $T/R$  loads. First described in terms of the known characteristics of two-dimensional airfoil data, these effects are discussed in general terms so that they may apply to the more complex flow in the flight performance of rotary-wing aircraft.

The variation of section lift coefficient and drag coefficient with free-stream Mach number is well known for the thin airfoil used in the UH-1 design (NACA 0012 for main rotor, NACA 0015 for tail rotor), as evidenced by Reference 8. Figure 3 shows the effect of compressibility on a two-dimensional lift coefficient for various angles of attack. The early separation of flow and the change in center of pressure result in the characteristics shown. The effect of compressibility on two-dimensional drag characteristics is shown on Figure 4. The drag coefficient rises markedly as the Mach number increases because of the shock forming on the airfoil as a result of local airfoil velocities. As indicated in Figure 5, the drag increase required an increase in engine power to maintain the forward airspeed. These figures represent data for an NACA 0012-34 airfoil, which is similar to the  $M/R$  blade section, at least for discussion purposes.

Although these two-dimensional characteristics represent the simple flow fields of fixed-wing aircraft, they may be reasonably assumed to represent to some degree the complex flow fields of rotary-wing aircraft in forward flight. This assumption would imply that high drag is expected when free-stream Mach numbers reach critical values, as the data in subsequent sections indicate. In addition, since the main rotor blade has a built-in twist along the spanwise axis, the measured chordwise and spanwise loads are both affected by the lift and drag.

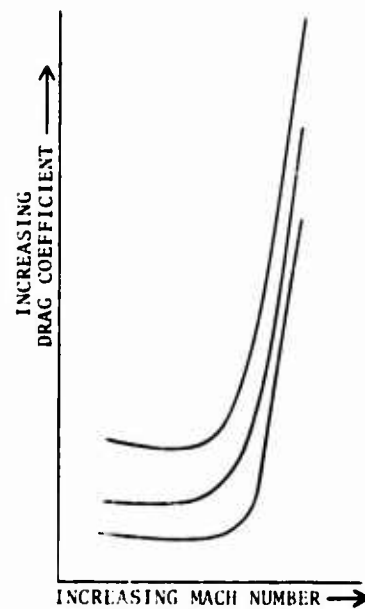


Figure 4. Compressibility Effects on Drag Coefficients.

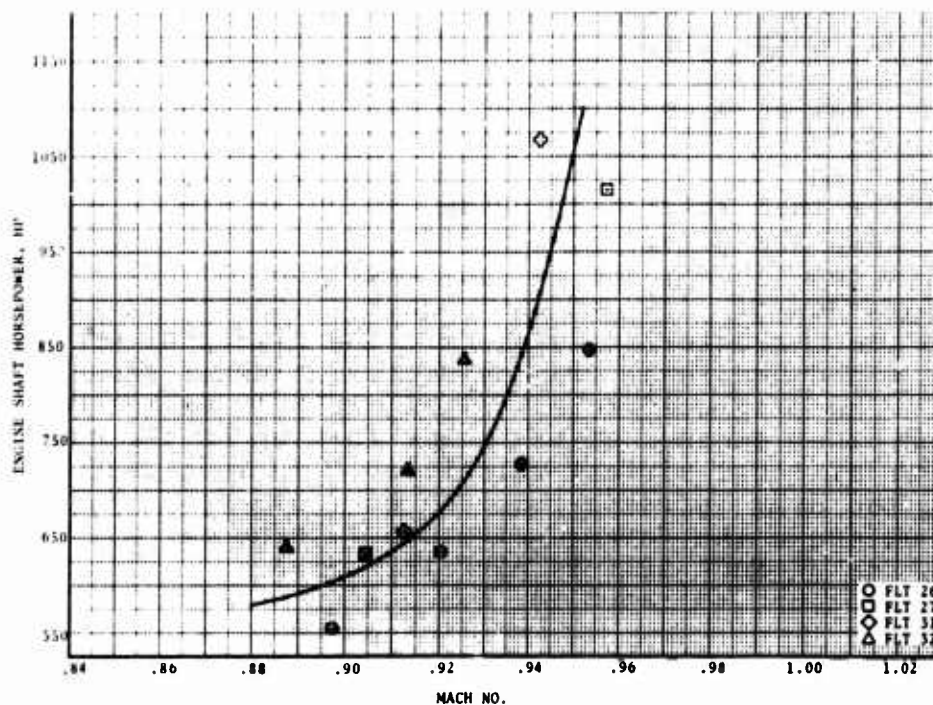


Figure 5. Mach Number Effects on Required Power.

### 7.9 Centrifugal Force - Temperature Compensation Trade-off Analysis

The reduction of the chordwise loads for the M/R and T/R blades was a problem because of the compromise required in

selecting a strain gage configuration for the blade instrumentation. The configuration had to cancel axial strains due to centrifugal loads, provide temperature compensation, and still produce chordwise strain trace deflections with sufficient amplitude for data reduction.

The first strain gage configuration to be selected consisted of two gages on the leading edge and two on the trailing edge wired to cancel axial strains due to centrifugal loads. Although this configuration proved to be independent of spanwise loads, the different coefficients of thermal expansion for the stainless steel in the leading edge and for the aluminum in the trailing edge caused an unacceptable strain. Consequently, after several strain gage configurations were tested, the final configuration included provisions for temperature compensation. This compensation, however, introduced mean centrifugal loads which had to be eliminated by analytical techniques.

Only the mean centrifugal loads are affected since, for a given flight condition, the rotor speed remains nearly constant; therefore, the centrifugal force remains constant and does not influence the oscillatory load levels. Thus, only an analysis of the mean chordwise loads is necessary.

This method is based on the fact that, knowing the main rotor and tail rotor mass distributions, centrifugal force can be calculated as a function of blade station and rotor speed. The data concerning the mass distributions on the main rotor and tail rotor blades were taken from References 9 and 10, respectively. By knowing these two distributions, an equation correlating centrifugal force with rotor speed for each station of interest on the blades was derived. These equations are presented in Table 9.

| TABLE 9. ANALYTICAL CENTRIFUGAL FORCE EQUATIONS |                             |
|---|-----------------------------|
| STATION, BLADE                                  | EQUATION                    |
| 192, MAIN                                       | $F = .478N_R^2 - 1.033 N_R$ |
| 150, MAIN                                       | $F = .609N_R^2 - 3.35 N_R$  |
| 11, TAIL  | $F = .1222N_R^2$            |
| 21.5, TAIL                                      | $F = .1052N_R^2$            |
| F = CENTRIFUGAL FORCE, LB                       |                             |
| $N_R$ = MAIN ROTOR SPEED, RPM                   |                             |

Since the stress due to centrifugal force is much greater than that of the chordwise bending moments during the flat pitch flight conditions, the assumption was made that at flat pitch, 250 rpm, the entire trace deflection recorded on the oscillogram was due to centrifugal force only. Since the centrifugal force component of the deflection varies linearly with centrifugal force, and since an analytical centrifugal force for the flat-pitch (250-rpm) flight condition can be calculated by applying the equations in Table 9 to the actual measured trace deflection, a linear relationship was established for trace deflection and centrifugal force. However, since centrifugal force is a known function of rotor speed and the deflection is a known function of centrifugal force, a relationship of trace deflection as a function of rotor speed was developed. Then for each flight condition, the measured rotor speed was used to calculate a deflection due to centrifugal force. This deflection was then subtracted from the measured deflection to give the deflection due to chordwise bending. The resultant deflection was then converted to engineering units by using the same procedures outlined previously.

The above-stated procedures were applied only to flights that had a flat-pitch (250-rpm) condition and therefore not to flights that had rotor speeds too high to make the same assumptions.

The following illustrates the application of the foregoing procedures to the data for Station 192 on the main rotor blade in flight No. 19:

First, the following equation expressing centrifugal force as a function of main rotor speed was derived from the mass distribution data and the information given in References 9 and 10:

$$F = 0.478N_R^2 - 1.033N_R \quad (9)$$

where  $F$  = centrifugal force, lb

$N_R$  = main rotor speed at flat-pitch condition, rpm

Therefore, since  $N_R = 246.6$  rpm,  $F = 28,816$  lb.

Since the centrifugal force deflection varies linearly with centrifugal force, a constant for the slope of the deflection versus the centrifugal force may be expressed as

$$K = \delta_m / F \quad (10)$$

where  $K$  = slope constant, in counts/lb

$\delta_m$  = measured trace deflection at flat-pitch condition,  
in semiautomatic reader counts

Therefore, since  $\delta_m = 193$ ,  $K = 0.0067$ .

Finally, the product of Equations (9) and (10) is

$$\delta_{CF} = KF = K(0.478N_R^2 - 1.033N_R) \quad (11)$$

where  $\delta_{CF}$  = trace deflection due to centrifugal force, in  
counts

Therefore, since  $K = 0.0067$ , Equation (11) becomes

$$\delta_{CF} = 0.0032N_R^2 - 0.0069N_R \quad (12)$$

Now the trace deflection due to centrifugal force may be calculated for any instant of flight by substituting the corresponding main rotor speed in Equation (12). Then the subtraction of this deflection from the measured deflection yields the mean chordwise moment.



## 8. CONCLUSIONS

As conclusively evidenced by the foregoing presentation of the loads data, the dynamic component loads varied with temperature as well as with density altitude during the cold-weather tests. The dependence of these loads on temperature is of great significance since current  $V_{ne}$  limitations on operational aircraft are based solely on density altitude. Also, as indicated in the data for the loads versus the rotor tip Mach number, the severe loading on the main and tail rotor components was due principally to the extreme cold temperatures in the arctic environment.

As indicated by the plots of beamwise oscillatory loads versus rotor blade Mach number for the main rotor blade at Stations 35, 150, and 192, the magnitude of the oscillatory loads on the UH-1H is twice those recorded on the UH-1D during the warm-weather tests. In similar plots for the tail rotor blade at Station 21.5, the magnitude of the oscillatory loads on the UH-1H is 90 percent greater than those recorded on the UH-1D.

During the UH-1H cold-weather tests, the combination of low temperature, negative density altitude, and unrestricted  $V_{ne}$  performance produced blade section Mach numbers in the transonic region. These Mach numbers in turn caused the greater loads, as explained in the discussion on the wind tunnel data for the section lift and drag coefficients.

## 9. RECOMMENDATIONS

As expressed above, the aerodynamic significance of the current loads data for helicopter performance in the arctic environment should be verified by further investigation. Because of the importance of the analytical and empirical relationship in explaining the significance of these loads, future investigation should include a computer model incorporating the latest state-of-the-art dynamic loads and a flight test program with helicopters instrumented with sensors to yield data such that the measured parameters may be directly compared with those in the computer output. Such an investigation would reveal (1) whether or not the load characteristics in the flight test program are independent of pilot techniques, aircraft dissimilarities, and test and calibration procedure differences, and (2) the additional analytic capabilities required to predict the loads in this environment. These findings will permit the trends observed in the reported data to be verified or modified and consequently will lead to a better capability of predicting them. In addition, such findings should be analyzed in the light of such considerations as past, present, and future usage and the size of the helicopter fleet.

A fatigue variability study should be initiated to determine the effect of the arctic environment on a helicopter fleet as follows: an operational usage spectrum should be formulated on the basis of the current data, and the service life of a typical helicopter structural component should be calculated according to existing fatigue substantiation methods. In addition, since these methods are based on the assumption that fatigue life is a function of only usage and loads, the effects of cold weather on fatigue-critical components should also be investigated.

In summary, the following three efforts are proposed:

- (1) An analytical study involving (a) the use of computer models incorporating methods to predict loads, (b) the analysis of these loads to determine the effects of various ambient flight conditions on them, and (c) the modification of existing aerodynamics principles, if necessary, to account for compressibility effects.
- (2) A flight test program with helicopters instrumented similarly as in the current program but also equipped with sensors to yield data directly comparable with those in the computer output and with pressure transducers to measure airfoil pressures on the main and tail rotor blades.

- (3) An analytical study to determine the effect of the current loads data on the fatigue substantiation and life of typical critical components.

## REFERENCES

1. Cox, Terry L., and Henry Pender, STRUCTURAL LOADS SURVEY DURING COLD WEATHER OPERATIONS INSTRUMENTATION REPORT, Technology Incorporated; U. S. Army Air Mobility Research and Development Laboratory, Fort Eustis, Virginia, January 1974.
2. OPERATOR'S MANUAL: ARMY MODEL UH-1D/H HELICOPTERS, Technical Manual 55-1520-210-10, Headquarters, Department of the Army, Washington, D.C., August 1971.
3. von Mises, Richard, THEORY OF FLIGHT, New York, McGraw Hill Book Company, Inc., 1945, p. 11.
4. Hurt, H.H., Jr., AERODYNAMICS FOR NAVAL AVIATORS, University of Southern California; NAVAIR 00-801-80, The Office of the Chief of Naval Operations Aviation Training Division, January 1965.
5. Orr, P., G. McCleod, and W. Goodell, FATIGUE LIFE SUBSTANTIATION OF DYNAMIC COMPONENTS FOR THE UH-1D HELICOPTER EQUIPPED WITH THE 48-FOOT DIAMETER ROTOR, Bell Helicopter Company, Report No. 205-099-135, May 1964.
6. LOAD LEVEL TESTS OF THE UH-1D HELICOPTER IN 48-FOOT DIAMETER MAIN ROTOR CONFIGURATION, Bell Helicopter Company, Report No. 205-099-049, April 1964.
7. Johnson, R. B., L. E. Clay, and R. E. Meyers, OPERATIONAL USE OF UH-1H HELICOPTERS IN SOUTHEAST ASIA, Technology Incorporated; USAAMRDL Technical Report 73-15, U. S. Army Air Mobility Research and Development Laboratory, Fort Eustis, Virginia, May 1973.
8. Abott, Ira H., and Albert E. VonDoenhoff, THEORY OF WING SECTIONS INCLUDING A SUMMARY OF AIR FORCE DATA, New York, Dover Publications, Inc., 1958.
9. Blankenship, B.L., ADVANCED UTILITY HELICOPTER HUB AND BLADE DYNAMIC MOMENT ANALYSIS AND DETERMINATION OF ROTOR FREQUENCIES, VOLUME I, Bell Helicopter Company, Report No. 204-099-668, February 1960.
10. Jennings, A.L., TAIL ROTOR RESEARCH AND DEVELOPMENT LOAD SURVEY, VOLUME I OF III, Bell Helicopter Company, Report No. 204-099-030, January 1963.
11. Dommasch, Daniel O., Sidney S. Shorby, and Thomas F. Connally, AIRPLANE AERODYNAMICS, Third Edition, New York, Pitman Publishing Corporation, 1961.

# REFERENCES - Concluded

12. Kuethe, A.M., and J.D. Schetzer, FOUNDATIONS OF AERO-DYNAMICS, New York, John Wiley and Sons, Inc., 1954.
13. Pruyn, Richard R., IN-FLIGHT MEASUREMENT OF ROTOR BLADE AIRLOADS, BENDING MOMENTS, AND MOTIONS, TOGETHER WITH ROTOR SHAFT LOADS AND FUSELAGE VIBRATION, ON A TANDEM ROTOR HELICOPTER, VOLUME V, INVESTIGATION OF BLADE STALL CONDITIONS; USAAVLABS Technical Report 67-9E, U. S. Army Aviation Materiel Laboratories, Fort Eustis, Virginia, April 1968.
14. Nikolsky, Alexander, HELICOPTER ANALYSES, New York, John Wiley and Sons, Inc., 1951.
15. Cardinale, S.V., HELICOPTER LOADS, paper presented at Sixth Structural Loads Workshop for Advanced Aerospace Projects, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, September 1974.

APPENDIX A

FLIGHT LOG AND AIRCRAFT  
CONFIGURATION DATA

This appendix contains two types of information: (1) a listing of the flight-by-flight log data and (2) the weight and balance forms to derive the aircraft gross weight and c.g. position for each test flight and configuration.

| A/C MODEL <u>JLH-1H</u> |          |          |             |           |           |           |           | BY _____ |                  |                    |
|-------------------------|----------|----------|-------------|-----------|-----------|-----------|-----------|----------|------------------|--------------------|
| S/N <u>67-17686</u>     |          |          |             |           |           |           |           |          |                  |                    |
| FLIGHT LOG              |          |          |             |           |           |           |           |          |                  |                    |
| DATE                    | G.R. NO. | FLT. NO. | DURA. (MIN) | TOT. TIME | G.W. (LB) | C.G. (IN) | TEMP (C°) | Hd (FT)  | FIELD CONDITIONS | COMMENTS           |
| 1-11                    |          | 01       | 40          | 40        | -         | -         | -         |          |                  | INST. MALFUNCTION  |
| 1-13                    |          | 02       | 20          | 60        | -         | -         | -34       |          | CLEAR            | INST. CHK. FLT.    |
| 1-13                    |          | 03       | 40          | 100       | 7969      | -         | -32       |          |                  | SCU TURNED OFF     |
| 1-14                    |          | 04       | 20          | 120       | 7701      | -         | -33       |          |                  | GROUND RUN         |
| 1-15                    |          | 05       | 75          | 195       | 8500      | 140.4     | -29       |          |                  | INST. CHK. FLT.    |
| 1-16                    |          | 06       | 10          | 205       | 8500      | 140.4     | -         |          |                  | INST. CHK. FLT.    |
| 1-18                    |          | 07       | 30          | 235       | 9500      | 142.0     | -32       |          |                  | PILOT CHK. FLT.    |
| 1-19                    |          | 08       | 60          | 295       | 9500      | 142.0     | -28       |          |                  | PILOT CHK. FLT.    |
| 1-20                    |          | 09       | 60          | 355       | 9500      | 142.0     | -33       |          | NIGHT, CLR       |                    |
| 1-20                    |          | 10       | 75          | 430       | 8700      | 142.0     | -33       |          | NIGHT, CLR       |                    |
| 1-21                    |          | 11       | 20          | 450       | -         | -         | -         |          |                  | TR. CHND. DETECTOR |
| 1-23                    |          | 12       | 10          | 460       | -         | -         | -         |          |                  | INST. CHECK        |
| 1-28                    |          | 13       | 70          | 530       | 9500      | 142.0     | -35       |          | CLEAR            |                    |
| 1-28                    |          | 14       | 70          | 600       | 9500      | 142.0     | -35       |          |                  |                    |
| 1-28                    |          | 15       | 45          | 645       | 9500      | 142.0     | -35       |          |                  |                    |
| 1-28                    |          | 16       | 60          | 705       | 8500      | 142.6     | -32       |          | NIGHT            |                    |
| 2-4                     |          | 17       | 60          | 765       | 8500      | 144       | -29       |          | -                | INST. CHK. FLT.    |
| 2-5                     |          | 18       | 30          | 795       | 8700      | -         | -11       |          | GUSTY            | INST. CHK. FLT.    |
| 2-11                    |          | 19       | 35          | 830       | 8500      | 144       | -28       |          | NIGHT            |                    |
| 2-11                    |          | 20       | 35          | 865       | 8500      | 144       | -29       |          | NIGHT            |                    |

| A/C MODEL <u>JLH-1H</u> |             |             |                |              |              |              |              | BY _____   |                     |                 |
|-------------------------|-------------|-------------|----------------|--------------|--------------|--------------|--------------|------------|---------------------|-----------------|
| S/N <u>67-17686</u>     |             |             |                |              |              |              |              |            |                     |                 |
| FLIGHT LOG              |             |             |                |              |              |              |              |            |                     |                 |
| DATE                    | G.R.<br>NO. | FLT.<br>NO. | DURA.<br>(MIN) | TOT.<br>TIME | G.W.<br>(LB) | C.G.<br>(IN) | TEMP<br>(C°) | Hd<br>(FT) | FIELD<br>CONDITIONS | COMMENTS        |
| 2-11                    |             | 21          | 60             | 925          | 9500         | 135.3        | -31          |            | CLEAR               |                 |
| 2-12                    |             | 22          | 65             | 990          | 9500         | 135.3        | -39          |            | NIGHT               | ONE RECORDER    |
| 2-12                    |             | 23          | 15             | 1005         | 9500         | 135.3        | -34          |            | NIGHT               | POOR VISIBILITY |
| 2-12                    |             | 24          | 55             | 1060         | 9500         | 135.3        | -31          |            | NIGHT               | ONE RECORDER    |
| 2-12                    |             | 25          | 43             | 1105         | 8500         | 134.1        | -32          |            | NIGHT               | ONE RECORDER    |
| 2-14                    |             | 26          | 45             | 1150         | 8500         | 132.7        | -33          |            | NIGHT, GUSTY        |                 |
| 2-14                    |             | 27          | 50             | 1200         | 8500         | 132.7        | -34          |            | NIGHT, GUSTY        |                 |
| 2-15                    |             | 28          | 30             | 1230         | 9500         | 135.3        | -28          |            | SNOW, GUSTY         |                 |
| 2-15                    |             | 29          | 60             | 1290         | 9500         | 135.3        | -28          |            |                     |                 |
| 2-15                    |             | 30          | 40             | 1330         | 9500         | 135.3        | -28          |            | NIGHT               |                 |
| 2-15                    |             | 31          | 60             | 1390         | 8500         | 132.7        | -28          |            | NIGHT               |                 |
| 2-15                    |             | 32          | 40             | 1430         | 8500         | 132.7        | -28          |            | NIGHT               |                 |

NOTE—THIS TRANSPORT CLEARANCE FORM HAS RESULTED FROM TRIPARTITE AGREEMENT AND NO FURTHER CHANGES MAY BE MADE TO IT WITHOUT PRIOR CONSIDERATION BY TRIPARTITE AUTHORITIES.

| WEIGHT AND BALANCE CLEARANCE FORM F<br>TRANSPORT<br>(USE REVERSE FOR TACTICAL MISSIONS) |                    |   |                                       |   |                          | Cross Reference<br>NAF Form 870<br>RCAP Form P 118 C<br>ROM 8-81 (1/77) |                    | FOR USE IN<br>T O 1 IB 40 4<br>AN 01-1B-40 |  |
|---|--------------------|---|---------------------------------------|---|--------------------------|---|--------------------|--|--|
| DATE  |                    | AIRPLANE TYPE                               |                                       | FROM  |                          | HOME STATION  |                    |  |  |
|   |                    | JLH-1H                                      |                                       | AAAF  |                          | Ft. GRUBLY  |                    |  |  |
| MISSION/TRIP/LIGHT/NO.  |                    | SERIAL NO.                                  |                                       | TO  |                          | PILOT   |                    |  |  |
|   |                    | 67-17686                                    |                                       | AS REQUIRED                                     |                          |   |                    |  |  |
| LIMITATIONS   |                    |   |                                       | R<br>E<br>F                                     | ITEM                     | WEIGHT  | INDEX OR<br>MOM/NO |  |  |
| CONDITION   | TAKEOFF            | LANDING                                     | LIMITING<br>WING FUEL                 |   |                          |   |                    |  |  |
| ALLOWABLE<br>GROSS WEIGHT   | 9500               | 9500  | —                                     | 1   | BASIC AIRPLANE (P/N 101) | 5688  | 8504               | 4  |  |
| TOTAL AIRPLANE<br>WEIGHT (Ref. 1)   | 8234               |   |                                       | 2   | OIL (Gal)                | 24  |                    | 42   |  |
| OPERATING WEIGHT<br>PLUS ESTIMATED LANDING<br>FUEL WEIGHT                               |                    | 8451  |                                       | 3   | CREW (No)                | 540   |                    | 321  |  |
| OPERATING WEIGHT<br>(Ref. 2)  |                    |   | 6485                                  | 4   | CREW'S BAGGAGE           |   |                    |  |  |
| ALLOWABLE LOAD (Ref. 10)<br>(See SMALLER ST. Above)                                     | 1266               | 1656  | —                                     | 5   | STEWARDS EQUIPMENT       |   |                    |  |  |
| PERMISSIBLE<br>C. G. TAKEOFF  | FROM 130           | TO (% M. A. C. or IN)                       | 144                                   | 6   | EMERGENCY EQUIPMENT      | 175   |                    | 253  |  |
| PERMISSIBLE<br>C. G. LANDING  | FROM 130           | TO (% M. A. C. or IN)                       | 144                                   | 7   | EXTRA EQUIPMENT          | 58  |                    | 87   |  |
| LANDING<br>FUEL WEIGHT  | 1049               | 12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD) |                                       |   | 8                        | OPERATING WEIGHT  | 6485               | 9207                                       |  |
| REMARKS<br>BATTERY IN APT COMP.<br>CRASHWORTHY FUEL SYS.<br>SURVIVAL EQUIP.             | UPPER COMPARTMENTS |   | LOWER COMPARTMENTS                    |   | 9                        | TAKEOFF FUEL (Gal)  | 1359               | 2078                                       |  |
|   | COMPT              | PASSENGERS                                  | CARGO                                 | COMPT   | PASSENGERS               | CARGO   | 10                 | WING-TO-WING (Avg. 60 Gal)                 |  |
|   | NO                 | WEIGHT                                      |                                       | NO  | WEIGHT                   |   | 11                 | TOTAL AIRPLANE WEIGHT                      |  |
|   | A                  |   | 125T                                  | 129.7   |                          |   |                    | 8234                                       |  |
|   | B                  |   | CRASH                                 | 120   |                          |   |                    | 11874                                      |  |
|   | C                  |   | CRASH                                 | 233   |                          |   |                    |  |  |
|   | D                  |   |                                       |   |                          |   |                    |  |  |
|   | E                  |   |                                       |   |                          |   |                    |  |  |
|   | F                  |   |                                       |   |                          |   |                    |  |  |
|   | G                  |   |                                       |   |                          |   |                    |  |  |
| TOTAL FUEL  |                    |   |                                       |   |                          |   |                    |  |  |
| TOTAL BAL.  |                    |   |                                       |   |                          |   |                    |  |  |
| COMPUTER PLATE NUMBER (If used)   |                    |   |                                       |   |                          |   |                    |  |  |
| 1 Enter constant used.  |                    |   |                                       |   |                          |   |                    |  |  |
| 2 Enter value from current applicable T. O.   |                    |   |                                       |   |                          |   |                    |  |  |
| 3 Applicable to gross weight (Ref. 13).   |                    |   |                                       |   |                          |   |                    |  |  |
| 4 Applicable to gross weight (Ref. 14).   |                    |   |                                       |   |                          |   |                    |  |  |
| 5 Ref. 9 minus Ref. 17.   |                    |   |                                       |   |                          |   |                    |  |  |
| CORRECTIONS (Ref. 15)   |                    |   |                                       | 13 TAKEOFF CONDITION (Uncorrected)              |                          | 8661  |                    | 12920                                      |  |
| COMPT   | ITEM               | CHANGES (+ or -)                            | 14 CORRECTIONS (If required)          | 15 TAKEOFF CONDITION (Corrected)                |                          | 8661  |                    | 12920                                      |  |
|   |                    | WEIGHT                                      | 16 TAKEOFF C. G. IN % M. A. C. OR IN. | 17 LESS FUEL                                    |                          | 700   |                    | 1114                                       |  |
|   |                    | INDEX OR MOM/                               | 18 LESS AIR SUPPLY LOAD DROPPED       | 19 MISC. VARIABLES                              |                          |   |                    |  |  |
|   |                    |   | 20 ESTIMATED LANDING CONDITION        | 21 ESTIMATED LANDING C. G. IN % M. A. C. OR IN. |                          | 7961  |                    | 11356                                      |  |
|   |                    |   |                                       | COMPUTED BY                                     |                          |   |                    |  |  |
|   |                    |   |                                       | SIGNATURE                                       |                          |   |                    |  |  |
| TOTAL WEIGHT REMOVED - -  |                    |   |                                       | WEIGHT AND BALANCE AUTHORITY                    |                          |   |                    |  |  |
| TOTAL WEIGHT ADDED + +  |                    |   |                                       | SIGNATURE                                       |                          |   |                    |  |  |
| NET DIFFERENCE (Ref. 16)  |                    |   |                                       | PILOT   |                          |   |                    |  |  |
|   |                    |   |                                       | SIGNATURE                                       |                          |   |                    |  |  |



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| WEIGHT AND BALANCE CLEARANCE FORM F<br>TRANSPORT<br>(USE REVERSE FOR TACTICAL MISSIONS) |  |                         |  |                  |                   |                       |  |                                 |  | Cross Reference<br>NAF Form 3470<br>ACAF Form F 118 C<br>ADM 6-51 (127) |  | FOR USE IN<br>T O 1 B 40 4<br>AN 01-18 40 |  |
|---|--|-------------------------|--|------------------|-------------------|-----------------------|--|---------------------------------|--|---|--|---|--|
| DATE  |  | AIRPLANE TYPE<br>JLH-1H |  |                  | FROM<br>AAAF      |                       |  | HOME STATION<br>FT. GORDY       |  |   |  |   |  |
| MISSION/TRIP/FLIGHT NO.   |  | SERIAL NO<br>67-17686   |  |                  | TO<br>As Required |                       |  | PILOT                           |  |   |  |   |  |
| LIMITATIONS   |  |                         |  |                  |                   |                       |  |                                 |  |   |  |   |  |
| CONDITION   |  | TAKEOFF                 |  | LANDING          |                   | LIMITING<br>WING FULL |  | ITEM                            |  | WEIGHT  |  | INDEX OR<br>MOM                           |  |
| 1 ALLOWABLE<br>GROSS WEIGHT   |  | 9500                    |  | 9500             |                   | —                     |  | 1 BASIC AIRPLANE (From Chart C) |  | 5688  |  | 8504                                      |  |
| 2 TOTAL AIRPLANE<br>WEIGHT (Ref. 1)   |  | 8999                    |  | 8999             |                   | —                     |  | 2 OIL ( )                       |  | 24  |  | 42  |  |
| 3 OPERATING WEIGHT<br>PLUS ESTIMATED LANDING<br>FUEL WEIGHT                             |  | 8999                    |  | 8999             |                   | —                     |  | 3 CREW (No)                     |  | 720   |  | 475                                       |  |
| 4 OPERATING WEIGHT<br>(Ref. 1)  |  | —                       |  | —                |                   | 6665                  |  | 4 CREW'S BAGGAGE                |  | —   |  | —   |  |
| 5 ALLOWABLE LOAD (Ref. 1)<br>(MAX. SMALLER OF 10)                                       |  | 501                     |  | 1001             |                   | —                     |  | 5 STEWARD'S EQUIPMENT           |  | —   |  | —   |  |
| 6 PERMISSIBLE<br>C. G. TAKEOFF  |  | FROM 134                |  | TO (% M.A.C. IN) |                   | 149                   |  | 6 EMERGENCY EQUIPMENT           |  | 175   |  | 253                                       |  |
| 7 PERMISSIBLE<br>C. G. LANDING  |  | FROM 130                |  | TO (% M.A.C. IN) |                   | 144                   |  | 7 EXTRA EQUIPMENT               |  | 58  |  | 88  |  |
| 8 LANDING<br>FUEL WEIGHT  |  | 1834                    |  | —                |                   | —                     |  | 8 OPERATING WEIGHT              |  | 6665  |  | 9360                                      |  |
| 9 TAKEOFF FUEL ( )  |  | 209                     |  | —                |                   | —                     |  | 9 TAKEOFF FUEL ( )              |  | 1359  |  | 2078                                      |  |
| 10 LANDING FUEL ( )   |  | —                       |  | —                |                   | —                     |  | 10 LANDING FUEL ( )             |  | 975   |  | 1472                                      |  |
| 11 TOTAL AIRPLANE WEIGHT  |  | —                       |  | —                |                   | —                     |  | 11 TOTAL AIRPLANE WEIGHT        |  | 8999  |  | 12710                                     |  |
| 12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)   |  |                         |  |                  |                   |                       |  |                                 |  |   |  |   |  |
| REMARKS   |  | COMPT                   |  | PASSENGERS       |                   | CARGO                 |  | COMPT                           |  | PASSENGERS  |  | CARGO                                     |  |
| BATTERY IN AIR CRAFT.   |  | NO                      |  | WEIGHT           |                   | —                     |  | NO                              |  | WEIGHT  |  | —   |  |
| CRAIN WORTHY FOR SYS.   |  | A                       |  | 100              |                   | 100                   |  | A                               |  | 100   |  | 100                                       |  |
| SURVIVAL EQUIP  |  | B                       |  | 100              |                   | 100                   |  | B                               |  | 100   |  | 100                                       |  |
| —   |  | C                       |  | 100              |                   | 100                   |  | C                               |  | 100   |  | 100                                       |  |
| —   |  | D                       |  | 100              |                   | 100                   |  | D                               |  | 100   |  | 100                                       |  |
| —   |  | E                       |  | 100              |                   | 100                   |  | E                               |  | 100   |  | 100                                       |  |
| —   |  | F                       |  | 100              |                   | 100                   |  | F                               |  | 100   |  | 100                                       |  |
| —   |  | G                       |  | 100              |                   | 100                   |  | G                               |  | 100   |  | 100                                       |  |
| —   |  | H                       |  | 100              |                   | 100                   |  | H                               |  | 100   |  | 100                                       |  |
| —   |  | I                       |  | 100              |                   | 100                   |  | I                               |  | 100   |  | 100                                       |  |
| —   |  | J                       |  | 100              |                   | 100                   |  | J                               |  | 100   |  | 100                                       |  |
| —   |  | K                       |  | 100              |                   | 100                   |  | K                               |  | 100   |  | 100                                       |  |
| —   |  | L                       |  | 100              |                   | 100                   |  | L                               |  | 100   |  | 100                                       |  |
| —   |  | M                       |  | 100              |                   | 100                   |  | M                               |  | 100   |  | 100                                       |  |
| —   |  | N                       |  | 100              |                   | 100                   |  | N                               |  | 100   |  | 100                                       |  |
| —   |  | O                       |  | 100              |                   | 100                   |  | O                               |  | 100   |  | 100                                       |  |
| —   |  | P                       |  | 100              |                   | 100                   |  | P                               |  | 100   |  | 100                                       |  |
| —   |  | Q                       |  | 100              |                   | 100                   |  | Q                               |  | 100   |  | 100                                       |  |
| —   |  | R                       |  | 100              |                   | 100                   |  | R                               |  | 100   |  | 100                                       |  |
| —   |  | S                       |  | 100              |                   | 100                   |  | S                               |  | 100   |  | 100                                       |  |
| —   |  | T                       |  | 100              |                   | 100                   |  | T                               |  | 100   |  | 100                                       |  |
| —   |  | U                       |  | 100              |                   | 100                   |  | U                               |  | 100   |  | 100                                       |  |
| —   |  | V                       |  | 100              |                   | 100                   |  | V                               |  | 100   |  | 100                                       |  |
| —   |  | W                       |  | 100              |                   | 100                   |  | W                               |  | 100   |  | 100                                       |  |
| —   |  | X                       |  | 100              |                   | 100                   |  | X                               |  | 100   |  | 100                                       |  |
| —   |  | Y                       |  | 100              |                   | 100                   |  | Y                               |  | 100   |  | 100                                       |  |
| —   |  | Z                       |  | 100              |                   | 100                   |  | Z                               |  | 100   |  | 100                                       |  |
| —   |  | AA                      |  | 100              |                   | 100                   |  | AA                              |  | 100   |  | 100                                       |  |
| —   |  | AB                      |  | 100              |                   | 100                   |  | AB                              |  | 100   |  | 100                                       |  |
| —   |  | AC                      |  | 100              |                   | 100                   |  | AC                              |  | 100   |  | 100                                       |  |
| —   |  | AD                      |  | 100              |                   | 100                   |  | AD                              |  | 100   |  | 100                                       |  |
| —   |  | AE                      |  | 100              |                   | 100                   |  | AE                              |  | 100   |  | 100                                       |  |
| —   |  | AF                      |  | 100              |                   | 100                   |  | AF                              |  | 100   |  | 100                                       |  |
| —   |  | AG                      |  | 100              |                   | 100                   |  | AG                              |  | 100   |  | 100                                       |  |
| —   |  | AH                      |  | 100              |                   | 100                   |  | AH                              |  | 100   |  | 100                                       |  |
| —   |  | AI                      |  | 100              |                   | 100                   |  | AI                              |  | 100   |  | 100                                       |  |
| —   |  | AJ                      |  | 100              |                   | 100                   |  | AJ                              |  | 100   |  | 100                                       |  |
| —   |  | AK                      |  | 100              |                   | 100                   |  | AK                              |  | 100   |  | 100                                       |  |
| —   |  | AL                      |  | 100              |                   | 100                   |  | AL                              |  | 100   |  | 100                                       |  |
| —   |  | AM                      |  | 100              |                   | 100                   |  | AM                              |  | 100   |  | 100                                       |  |
| —   |  | AN                      |  | 100              |                   | 100                   |  | AN                              |  | 100   |  | 100                                       |  |
| —   |  | AO                      |  | 100              |                   | 100                   |  | AO                              |  | 100   |  | 100                                       |  |
| —   |  | AP                      |  | 100              |                   | 100                   |  | AP                              |  | 100   |  | 100                                       |  |
| —   |  | AQ                      |  | 100              |                   | 100                   |  | AQ                              |  | 100   |  | 100                                       |  |
| —   |  | AR                      |  | 100              |                   | 100                   |  | AR                              |  | 100   |  | 100                                       |  |
| —   |  | AS                      |  | 100              |                   | 100                   |  | AS                              |  | 100   |  | 100                                       |  |
| —   |  | AT                      |  | 100              |                   | 100                   |  | AT                              |  | 100   |  | 100                                       |  |
| —   |  | AU                      |  | 100              |                   | 100                   |  | AU                              |  | 100   |  | 100                                       |  |
| —   |  | AV                      |  | 100              |                   | 100                   |  | AV                              |  | 100   |  | 100                                       |  |
| —   |  | AW                      |  | 100              |                   | 100                   |  | AW                              |  | 100   |  | 100                                       |  |
| —   |  | AX                      |  | 100              |                   | 100                   |  | AX                              |  | 100   |  | 100                                       |  |
| —   |  | AY                      |  | 100              |                   | 100                   |  | AY                              |  | 100   |  | 100                                       |  |
| —   |  | AZ                      |  | 100              |                   | 100                   |  | AZ                              |  | 100   |  | 100                                       |  |
| —   |  | BA                      |  | 100              |                   | 100                   |  | BA                              |  | 100   |  | 100                                       |  |
| —   |  | BB                      |  | 100              |                   | 100                   |  | BB                              |  | 100   |  | 100                                       |  |
| —   |  | BC                      |  | 100              |                   | 100                   |  | BC                              |  | 100   |  | 100                                       |  |
| —   |  | BD                      |  | 100              |                   | 100                   |  | BD                              |  | 100   |  | 100                                       |  |
| —   |  | BE                      |  | 100              |                   | 100                   |  | BE                              |  | 100   |  | 100                                       |  |
| —   |  | BF                      |  | 100              |                   | 100                   |  | BF                              |  | 100   |  | 100                                       |  |
| —   |  | BG                      |  | 100              |                   | 100                   |  | BG                              |  | 100   |  | 100                                       |  |
| —   |  | BH                      |  | 100              |                   | 100                   |  | BH                              |  | 100   |  | 100                                       |  |
| —   |  | BI                      |  | 100              |                   | 100                   |  | BI                              |  | 100   |  | 100                                       |  |
| —   |  | BJ                      |  | 100              |                   | 100                   |  | BJ                              |  | 100   |  | 100                                       |  |
| —   |  | BK                      |  | 100              |                   | 100                   |  | BK                              |  | 100   |  | 100                                       |  |
| —   |  | BL                      |  | 100              |                   | 100                   |  | BL                              |  | 100   |  | 100                                       |  |
| —   |  | BM                      |  | 100              |                   | 100                   |  | BM                              |  | 100   |  | 100                                       |  |
| —   |  | BN                      |  | 100              |                   | 100                   |  | BN                              |  | 100   |  | 100                                       |  |
| —   |  | BO                      |  | 100              |                   | 100                   |  | BO                              |  | 100   |  | 100                                       |  |
| —   |  | BP                      |  | 100              |                   | 100                   |  | BP                              |  | 100   |  | 100                                       |  |
| —   |  | BQ                      |  | 100              |                   | 100                   |  | BQ                              |  | 100   |  | 100                                       |  |
| —   |  | BR                      |  | 100              |                   | 100                   |  | BR                              |  | 100   |  | 100                                       |  |
| —   |  | BS                      |  | 100              |                   | 100                   |  | BS                              |  | 100   |  | 100                                       |  |
| —   |  | BT                      |  | 100              |                   | 100                   |  | BT                              |  | 100   |  | 100                                       |  |
| —   |  | BU                      |  | 100              |                   | 100                   |  | BU                              |  | 100   |  | 100                                       |  |
| —   |  | BV                      |  | 100              |                   | 100                   |  | BV                              |  | 100   |  | 100                                       |  |
| —   |  | BW                      |  | 100              |                   | 100                   |  | BW                              |  | 100   |  | 100                                       |  |
| —   |  | BX                      |  | 100              |                   | 100                   |  | BX                              |  | 100   |  | 100                                       |  |
| —   |  | BY                      |  | 100              |                   | 100                   |  | BY                              |  | 100   |  | 100                                       |  |
| —   |  | BZ                      |  | 100              |                   | 100                   |  | BZ                              |  | 100   |  | 100                                       |  |
| —   |  | CA                      |  | 100              |                   | 100                   |  | CA                              |  | 100   |  | 100                                       |  |
| —   |  | CB                      |  | 100              |                   | 100                   |  | CB                              |  | 100   |  | 100                                       |  |
| —   |  | CC                      |  | 100              |                   | 100                   |  | CC                              |  | 100   |  | 100                                       |  |
| —   |  | CD                      |  | 100              |                   | 100                   |  | CD                              |  | 100   |  | 100                                       |  |
| —   |  | CE                      |  | 100              |                   | 100                   |  | CE                              |  | 100   |  | 100                                       |  |
| —   |  | CF                      |  | 100              |                   | 100                   |  | CF                              |  | 100   |  | 100                                       |  |
| —   |  | CG                      |  | 100              |                   | 100                   |  | CG                              |  | 100   |  | 100                                       |  |
| —   |  | CH                      |  | 100              |                   | 100                   |  | CH                              |  | 100   |  | 100                                       |  |
| —   |  | CI                      |  | 100              |                   | 100                   |  | CI                              |  | 100   |  | 100                                       |  |
| —   |  | CJ                      |  | 100              |                   | 100                   |  | CJ                              |  | 100   |  | 100                                       |  |
| —   |  | CK                      |  | 100              |                   | 100                   |  | CK                              |  | 100   |  | 100                                       |  |
| —   |  | CL                      |  | 100              |                   | 100                   |  | CL                              |  | 100   |  | 100                                       |  |
| —   |  | CM                      |  | 100              |                   | 100                   |  | CM                              |  | 100   |  | 100                                       |  |
| —   |  | CN                      |  | 100              |                   | 100                   |  | CN                              |  | 100   |  | 100                                       |  |
| —   |  | CO                      |  | 100              |                   | 100                   |  | CO                              |  | 100   |  | 100                                       |  |
| —   |  | CP                      |  | 100              |                   | 100                   |  | CP                              |  | 100   |  | 100                                       |  |
| —   |  | CQ                      |  | 100              |                   | 100                   |  | CQ                              |  | 100   |  | 100                                       |  |
| —   |  | CR                      |  | 100              |                   | 100                   |  | CR                              |  | 100   |  | 100                                       |  |
| —   |  | CS                      |  | 100              |                   | 100                   |  | CS                              |  | 100   |  | 100                                       |  |
| —   |  | CT                      |  | 100              |                   | 100                   |  | CT                              |  | 100   |  | 100                                       |  |
| —   |  | CU                      |  | 100              |                   | 100                   |  | CU                              |  | 100   |  | 100                                       |  |
| —   |  | CV                      |  | 100              |                   | 100                   |  | CV                              |  | 100   |  | 100                                       |  |
| —   |  | CW                      |  | 100              |                   | 100                   |  | CW                              |  | 100   |  | 100                                       |  |
| —   |  | CX                      |  | 100              |                   | 100                   |  | CX                              |  | 100   |  | 100                                       |  |
| —   |  | CY                      |  | 100              |                   | 100                   |  | CY                              |  | 100   |  | 100                                       |  |
| —   |  | CZ                      |  | 100              |                   | 100                   |  | CZ                              |  | 100   |  | 100                                       |  |
| —   |  | DA                      |  | 100              |                   | 100                   |  | DA                              |  | 100   |  | 100                                       |  |
| —   |  | DB                      |  | 100              |                   | 100                   |  | DB                              |  | 100   |  | 100                                       |  |
| —   |  | DC                      |  | 100              |                   | 100                   |  | DC                              |  | 100   |  | 100                                       |  |
| —   |  | DD                      |  | 100              |                   | 100                   |  | DD                              |  | 100   |  | 100                                       |  |
| —   |  | DE                      |  | 100              |                   | 100                   |  | DE                              |  | 100   |  | 100                                       |  |
| —   |  | DF                      |  | 100              |                   | 100                   |  | DF                              |  | 100   |  | 100                                       |  |
| —   |  | DG                      |  | 100              |                   | 100                   |  | DG                              |  | 100   |  | 100                                       |  |
| —   |  | DH                      |  | 100              |                   | 100                   |  | DH                              |  | 100   |  | 100                                       |  |
| —   |  | DI                      |  | 100              |                   | 100                   |  | DI                              |  | 100   |  | 100                                       |  |
| —   |  | DJ                      |  | 100              |                   | 100                   |  | DJ                              |  | 100   |  | 100                                       |  |
| —   |  | DK                      |  | 100              |                   | 100                   |  | DK                              |  | 100   |  | 100                                       |  |
| —   |  | DL                      |  | 100              |                   | 100                   |  | DL                              |  | 100   |  | 100                                       |  |
| —   |  | DM                      |  | 100              |                   | 100                   |  | DM                              |  | 100   |  | 100                                       |  |
| —   |  | DN                      |  | 100              |                   | 100                   |  | DN                              |  | 100   |  | 100                                       |  |
| —   |  | DO                      |  | 100              |                   | 100                   |  | DO                              |  | 100   |  | 100                                       |  |
| —   |  | DP                      |  | 100              |                   | 100                   |  | DP                              |  | 100   |  | 100                                       |  |
| —   |  | DQ                      |  | 100              |                   | 100                   |  | DQ                              |  | 100   |  | 100                                       |  |
| —   |  | DR                      |  | 100              |                   | 100                   |  | DR                              |  | 100   |  | 100                                       |  |
| —   |  | DS                      |  | 100              |                   | 100                   |  | DS                              |  | 100   |  | 100                                       |  |
| —   |  | DT                      |  | 100              |                   | 100                   |  | DT                              |  | 100   |  | 100                                       |  |
|   |  |                         |  |                  |                   |                       |  |                                 |  |   |  |   |  |

## APPENDIX B

### CALIBRATION AND READING ERROR DATA

For each of the recorded parameters, this appendix presents the transducer and galvanometer type to record the parameter variation on the oscillograms and the calibration factor to convert the parameter deflections to corresponding engineering units.

With reading errors based on a measurement error of 2 counts on a scale of 200 counts per inch, the reading error for each parameter channel was computed as follows:

- (1) Component Loads and Moments

$$\frac{(2 \text{ counts}) \times (\text{channel slope})}{\text{maximum oscillatory level-flight value}}$$

- (2) Engine Torque Pressure

$$\frac{(2 \text{ counts}) \times (\text{channel slope})}{\text{maximum allowable torque pressure, 50 psi}}$$

- (3) Airspeed

$$\frac{(2 \text{ counts}) \times (\text{channel slope})}{\text{maximum allowable airspeed, 120 kn}}$$

- (4) Outside Air Temperature

$$\frac{(2 \text{ counts}) \times (\text{channel slope})}{\text{coldest recorded temperature, } -59^{\circ}\text{F}}$$

- (5) Longitudinal, Lateral, and Vertical Acceleration

$$\frac{(2 \text{ counts}) \times (\text{channel slope})}{\text{level-flight acceleration, } 1g}$$

- (6) Pressure Altitude

$$\frac{(2 \text{ counts}) \times (\text{channel slope})}{\text{standard-day pressure, 29.92 in. of Hg}}$$

| OSCILLOGRAPH NO. <u>1</u><br>DATE <u>JAN-FEB 1974</u><br>A/C MODEL <u>JLH-1H</u><br>S/N <u>67-17686</u> |                      |       |                          | CALIBRATION DATA      |                  | FLIGHT <u>06 thru 16</u><br>SHEET <u>1</u> OF <u>4</u> |                  |            |  |
|---|----------------------|-------|--------------------------|-----------------------|------------------|--|------------------|------------|--|
| TR. NO.   | RECORDED PARAMETER   | UNITS | UPSCALE TRACE DEFLECTION | REFERENCE TRACE VALUE | CAL. PULSE VALUE | TRANS S/N  | TRANS. TYPE      | GALVO TYPE |  |
| 1   | MR CHORD 192 MOM     | IN-LB | NEG MOMENT               | -                     | 18621.0          | -  | strain gage      | 7-315      |  |
| 2   | MR BEAM 192 MOM      | IN-LB | POS MOMENT               | -                     | 5066.0           | -  |                  |            |  |
| 3   | MR CHORD 150 MOM     | IN-LB | NEG MOMENT               | -                     | 43697.0          | -  |                  |            |  |
| 4   | MR BEAM 150 MOM      | IN-LB | POS MOMENT               | -                     | 5023.0           | -  |                  |            |  |
| 5   | MR BEAM 35 MOM       | IN-LB | POS MOMENT               | -                     | 16798.0          | -  |                  |            |  |
| 6   | DRAG BRACE LOAD      | LB    | COMPRESSION              | -                     | 3537.0           | -  |                  |            |  |
| 7   | -                    | -     | -                        | -                     | -                | -  |                  |            |  |
| 8   | SCISSORS LINK LOAD   | LB    | COMPRESSION              | -                     | 440.9            | -  | strain gage      | 7-315      |  |
| 9   | -                    | -     | -                        | -                     | -                | -  |                  |            |  |
| 10  | -                    | -     | -                        | -                     | -                | -  |                  |            |  |
| 11  | LONG. BOOST TUBE     | LB    | COMPRESSION              | -                     | 481.2            | -  | strain gage      | 7-315      |  |
| 12  | LAT. BOOST TUBE      | LB    | COMPRESSION              | -                     | 452.5            | -  |                  |            |  |
| 13  | COLL. BOOST TUBE     | LB    | COMPRESSION              | -                     | 454.8            | -  |                  |            |  |
| 14  | COLL. STICK POSITION | %     | DOWN                     | -                     | -                | -  | potentiometer    | 7-339      |  |
| 15  | LONG. STICK POSITION | %     | AFT                      | -                     | -                | -  |                  |            |  |
| 16  | LAT. STICK POSITION  | %     | RIGHT                    | -                     | -                | -  |                  |            |  |
| 17  | VOLTAGE MONITOR      | -     | -                        | -                     | -                | -  |                  | 7-312      |  |
| 18  | MR AZIMUTH           | -     | -                        | -                     | -                | -  | magnetic pick-up | 7-312      |  |
| COMMENTS:   |                      |       |                          |                       |                  |  |                  |            |  |

| OSCILLOGRAPH NO. <u>2</u><br>DATE <u>JAN-FEB 1974</u><br>A/C MODEL <u>JLH-1H</u><br>S/N <u>67-17682</u> |                    |        |                          | CALIBRATION DATA      |                  | FLIGHT <u>06 THRU 16</u><br>SHEET <u>2</u> OF <u>4</u> |                     |            |  |
|---|--------------------|--------|--------------------------|-----------------------|------------------|--|---------------------|------------|--|
| TR. NO.   | RECORDED PARAMETER | UNITS  | UPSCALE TRACE DEFLECTION | REFERENCE TRACE VALUE | CAL. PULSE VALUE | TRANS S/N  | TRANS. TYPE         | GALVO TYPE |  |
| 1   | TR CHORD 11.0 MOM  | IN-LB  | NEG MOMENT               | -                     | 1437.3           | -  | strain gage         | 7-315      |  |
| 2   | TR BEAM 11.0 MOM   | IN-LB  | NEG MOMENT               | -                     | 940.3            | -  |                     |            |  |
| 3   | TR CHORD 21.5 MOM  | IN-LB  | NEG MOMENT               | -                     | 1233.6           | -  |                     |            |  |
| 4   | TR BEAM 21.5 MOM   | IN-LB  | NEG MOMENT               | -                     | 452.2            | -  |                     |            |  |
| 5   | TR SHAFT TORQUE    | IN-LB  | NEG TORQUE               | -                     | 697.4            | -  |                     | 7-339      |  |
| 6   | TR AZIMUTH         | -      | -                        | -                     | -                | -  | magnetic pick-up    | 7-312      |  |
| 7   | MR AZIMUTH         | -      | -                        | -                     | -                | -  |                     |            |  |
| 8   | OAT                | F°     | INCREASING               | -                     | 25.8             | -  | cup anemometer      | 7-339      |  |
| 9   | Nx                 | g      | POSITIVE                 | -                     | 1.04             | 12091  | accelerometer       | 7-341      |  |
| 10  | Ny                 | g      | POSITIVE                 | -                     | .75              | 12044  |                     |            |  |
| 11  | Nz                 | g      | POSITIVE                 | -                     | .81              | 12070  |                     |            |  |
| 12  | RUDDER PEDAL POS.  | %      | RIGHT                    | -                     | -                | -  | potentiometer       |            |  |
| 13  | ROTOR SPEED        | RPM    | DECREASING               | -                     | -                | -  | **                  | 7-315      |  |
| 14  | ALTITUDE           | IN.HG. | DECREASING               | -                     | 5.99             | 65   | pressure transducer |            |  |
| 15  | AIRSPEED           | IN.HG. | INCREASING               | -                     | .752             | 2802   |                     |            |  |
| 16  | ENGINE TORQUE      | IN.HG. | DECREASING               | -                     | 77.2             | 143468   |                     |            |  |
| 17  | VOLTAGE MONITOR    | -      | -                        | -                     | -                | -  |                     | 7-312      |  |
| 18  | -                  | -      | -                        | -                     | -                | -  |                     |            |  |
| COMMENTS:   |                    |        |                          |                       |                  |  |                     |            |  |
| ** FREQUENCY TO VOLTAGE CONVERTER   |                    |        |                          |                       |                  |  |                     |            |  |



| PERCENT READING ERROR FOR RECORDED PARAMETERS BY FLIGHT |        |      |      |      |      |      |      |
|---|--------|------|------|------|------|------|------|
| RECORDED<br>PARAMETERS                                  | FLIGHT |      |      |      |      |      |      |
|   | 13     | 14   | 15   | 16   | 19   | 20   | 21   |
| MR CHORD 192 MOM  | 2.67   | -    | -    | -    | 3.45 | 3.33 | 2.63 |
| MR BEAM 192 MOM   | .82    | .85  | .78  | .81  | .93  | .91  | .75  |
| MR CHORD 150 MOM  | -      | -    | -    | -    | 2.67 | 2.86 | 1.89 |
| MR BEAM 150 MOM   | .73    | .71  | .82  | .76  | .83  | .89  | .66  |
| MR BEAM 35 MOM  | 1.82   | 1.80 | 1.94 | 1.80 | 2.50 | 2.06 | 1.32 |
| DRAG BRACE LOAD   | 1.74   | 2.35 | 2.44 | 1.40 | 2.00 | 2.08 | 1.43 |
| SCISSORS LINK LOAD                                      | 1.18   | .68  | .93  | .95  | 1.31 | 1.39 | 1.13 |
| LONG. BOOST TUBE  | -      | -    | -    | 2.78 | 2.90 | 1.85 | 2.16 |
| LAT. BOOST TUBE   | 1.61   | 2.00 | 2.74 | 2.15 | 2.33 | 1.57 | 1.08 |
| COLL. BOOST TUBE  | .95    | 1.21 | 2.17 | .78  | 1.54 | 1.45 | .62  |
| TR CHORD 11.0 MOM                                       | -      | -    | 2.86 | 1.82 | 2.50 | -    | -    |
| TR BEAM 11.0 MOM  | 1.20   | 1.39 | 1.41 | .94  | 1.26 | .79  | .43  |
| TR CHORD 21.5 MOM                                       | 3.13   | 3.03 | 6.90 | 3.13 | 4.88 | 2.94 | -    |
| TR BEAM 21.5 MOM  | 1.90   | .89  | 2.82 | 1.90 | 2.44 | 2.11 | 1.07 |
| TR SHAFT TORQUE   | 3.08   | 4.14 | 5.13 | 3.64 | 3.85 | 2.78 | 1.77 |
| OAT   | .49    | .47  | .48  | .46  | .57  | .58  | .57  |
| Nx  | .65    | .67  | .63  | -    | .80  | .81  | .79  |
| Ny  | .48    | .47  | .45  | 4.17 | .54  | .56  | .54  |
| Nz  | 1.18   | 1.27 | .92  | 10.0 | 1.46 | 1.51 | 1.47 |
| ALTITUDE  | .07    | .07  | .07  | .07  | .07  | .04  | .04  |
| AIRSPPEED   | .50    | .50  | .50  | .58  | .49  | .31  | .31  |
| ENGINE TORQUE   | .31    | .31  | .30  | .30  | .37  | .37  | .37  |

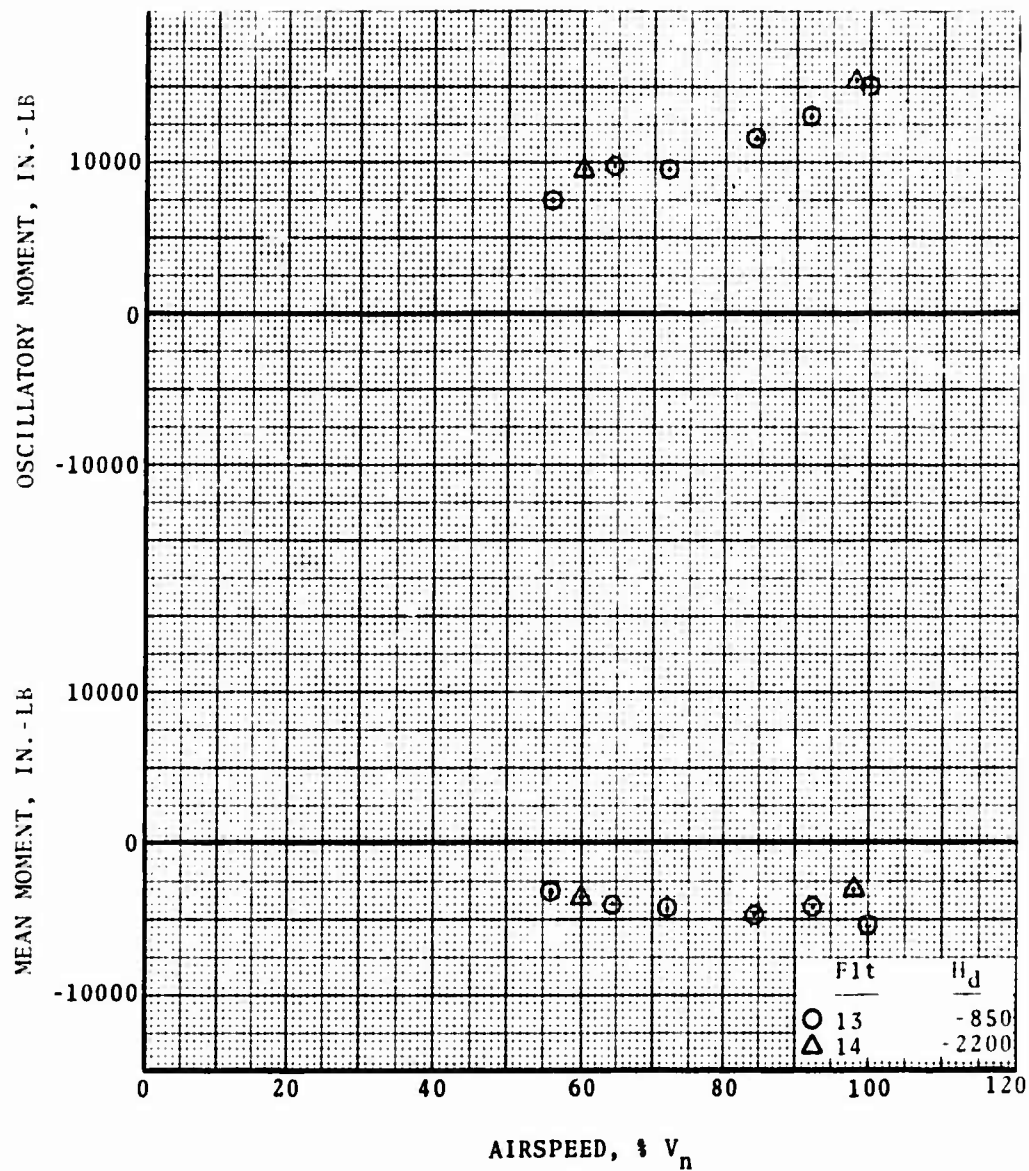
| PERCENT READING ERROR FOR RECORDED PARAMETERS BY FLIGHT |        |      |      |      |      |      |      |
|---|--------|------|------|------|------|------|------|
| RECORDED<br>PARAMETER                                   | FLIGHT |      |      |      |      |      |      |
|   | 26     | 27   | 28   | 29   | 30   | 31   | 32   |
| MR CHORD 192 MOM  | 3.45   | 3.45 | 3.08 | 2.94 | 2.67 | 2.94 | 3.64 |
| MR BEAM 192 MOM   | 1.05   | .80  | .81  | .84  | 1.65 | .85  | .98  |
| MR CHORD 150 MOM  | 3.57   | 2.50 | 2.11 | 2.25 | 2.86 | 2.22 | 3.28 |
| MR BEAM 150 MOM   | .87    | .71  | .69  | .77  | .85  | .74  | .82  |
| MR BEAM 35 MOM  | 2.90   | 1.77 | 1.87 | 1.80 | 2.30 | 1.60 | 1.79 |
| DRAG BRACE LOAD   | 2.20   | 1.61 | 1.49 | 1.68 | 1.98 | 1.60 | 2.00 |
| SCISSORS LINK LOAD                                      | 2.25   | 1.11 | .87  | 1.06 | 2.22 | .98  | 1.64 |
| LONG. BOOST TUBE  | 2.99   | 2.74 | 1.80 | 2.78 | 4.44 | 2.94 | 3.57 |
| LAT. BOOST TUBE   | 6.25   | 1.82 | 1.61 | 1.90 | 4.08 | 1.77 | 3.28 |
| COLL. BOOST TUBE  | 3.17   | 1.26 | 1.05 | 1.09 | 2.11 | 1.09 | 2.53 |
| TR CHORD 11.0 MOM                                       | -      | -    | -    | -    | -    | -    | -    |
| TR BEAM 11.0 MOM  | -      | -    | -    | -    | -    | -    | -    |
| TR CHORD 21.5 MOM                                       | 3.77   | 3.51 | 3.17 | 3.89 | 3.70 | 2.86 | 4.00 |
| TR BEAM 21.5 MOM  | 1.82   | 1.27 | 1.54 | 1.57 | 2.02 | 1.33 | 1.90 |
| TR SHAFT TORQUE   | 3.39   | 2.15 | 2.50 | 3.64 | 4.17 | 2.86 | 3.08 |
| OAT   | .58    | .56  | .57  | .57  | .56  | .57  | .57  |
| Nx  | .80    | .78  | .80  | .80  | .81  | .80  | .79  |
| Ny  | .55    | .54  | .56  | .55  | .56  | .56  | .56  |
| Nz  | 1.48   | 1.44 | 1.49 | 1.49 | 1.48 | 1.48 | 1.52 |
| ALTITUDE  | .05    | .05  | .05  | .05  | .05  | .05  | .05  |
| AIRSPPEED   | .40    | .40  | .39  | .40  | .39  | .40  | .40  |
| ENGINE TORQUE   | .37    | .37  | .37  | .37  | .37  | .37  | .37  |

## APPENDIX C

### GRAPHS OF SELECTED LEVEL-FLIGHT DATA

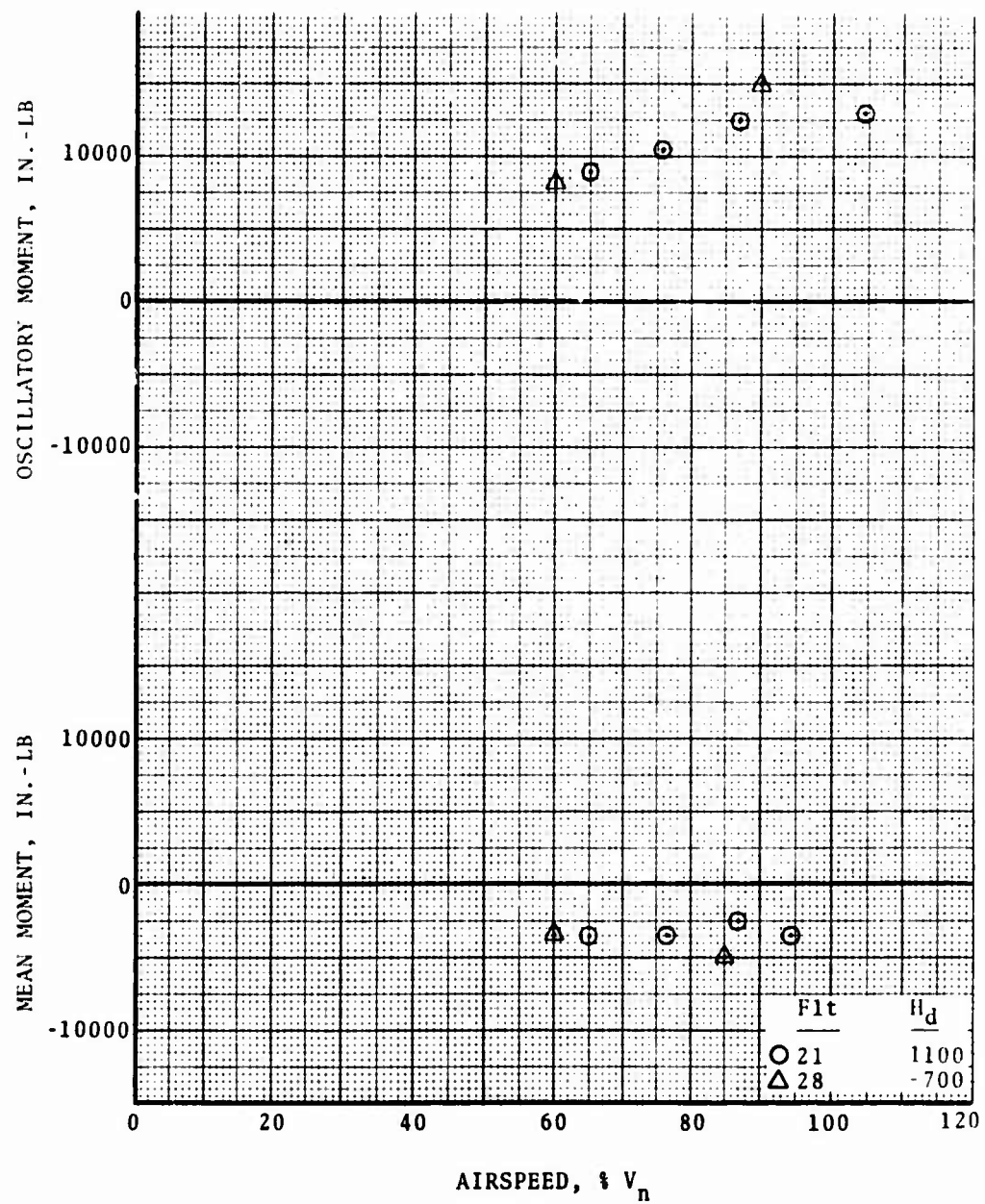
This appendix contains four types of graphs for selected level-flight data: (1) component load versus airspeed, (2) engine shaft horsepower versus main rotor tip Mach number, (3) tail and main rotor oscillatory bending moments versus rotor tip Mach number, and (4) airspeed versus main rotor tip Mach number.





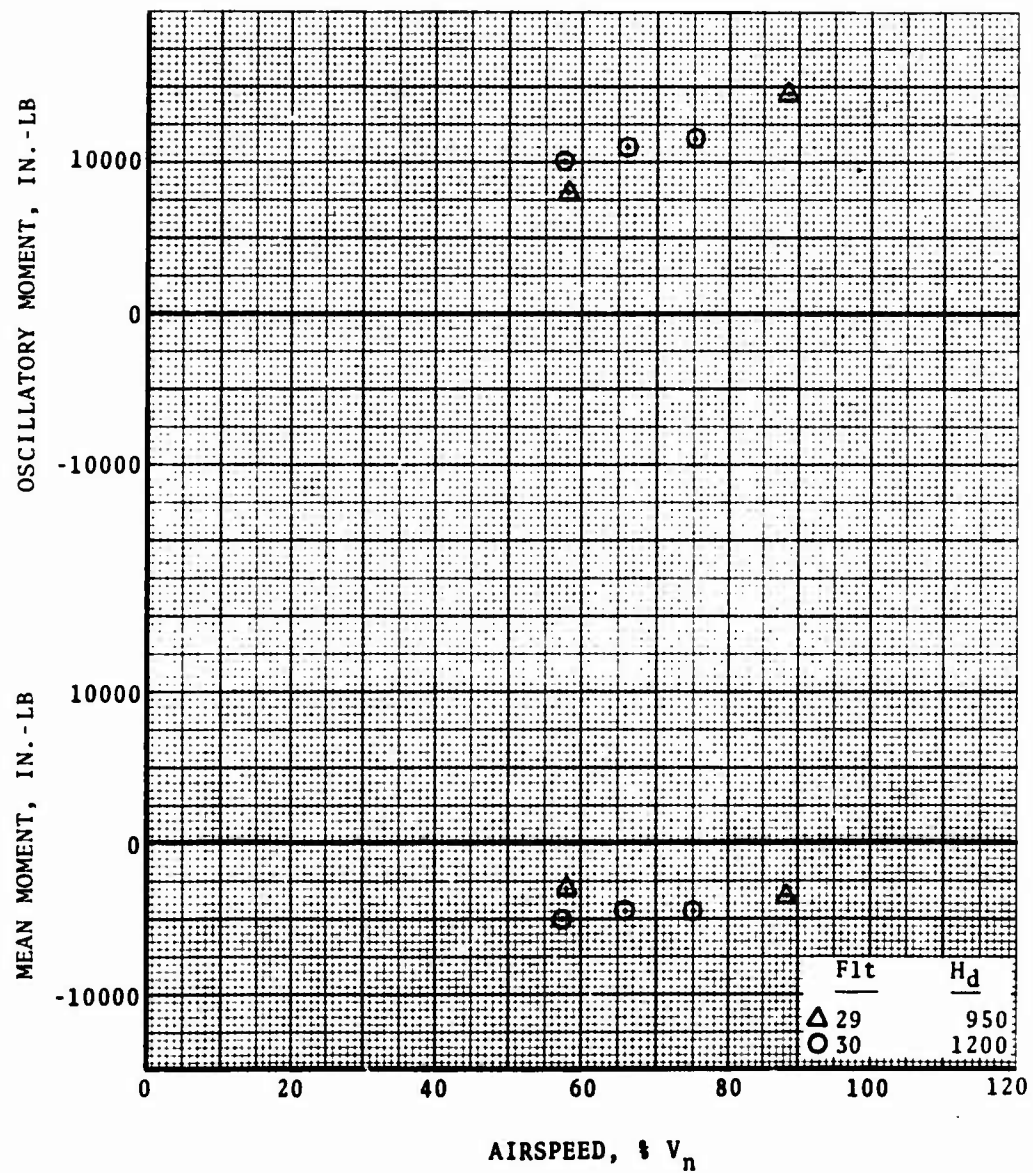
a) Flights 13 and 14, 9500-lb Gross Weight, and AFT C.G.

Figure C-1. Main Rotor Blade Beamwise Bending at Station 192 vs Airspeed for Various Density Altitudes by Flight, Gross Weight, and C.G. Position.



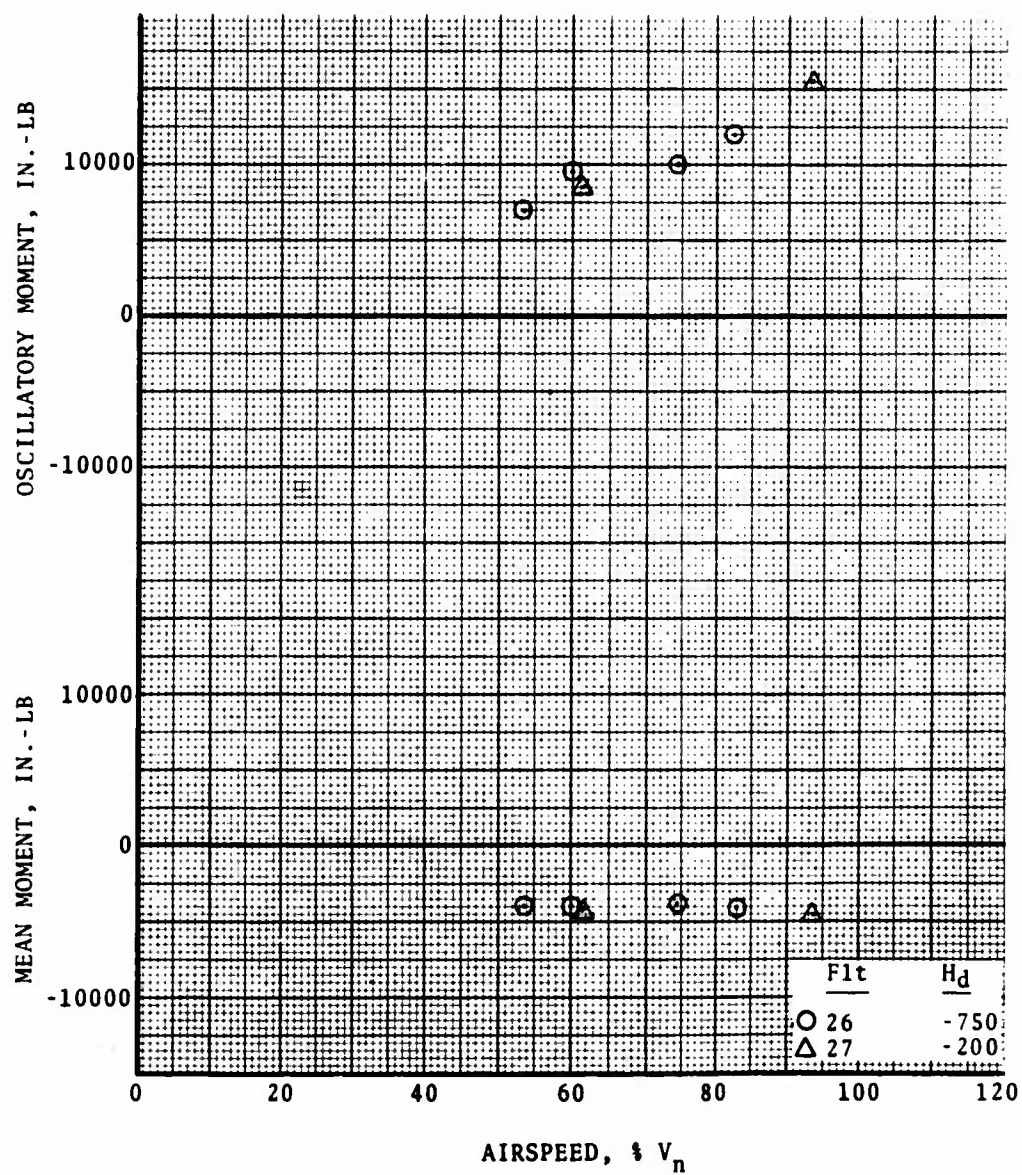
b) Flights 21 and 28, 9500-lb Gross Weight, and FWD C.G.

Figure C-1. (Cont'd)



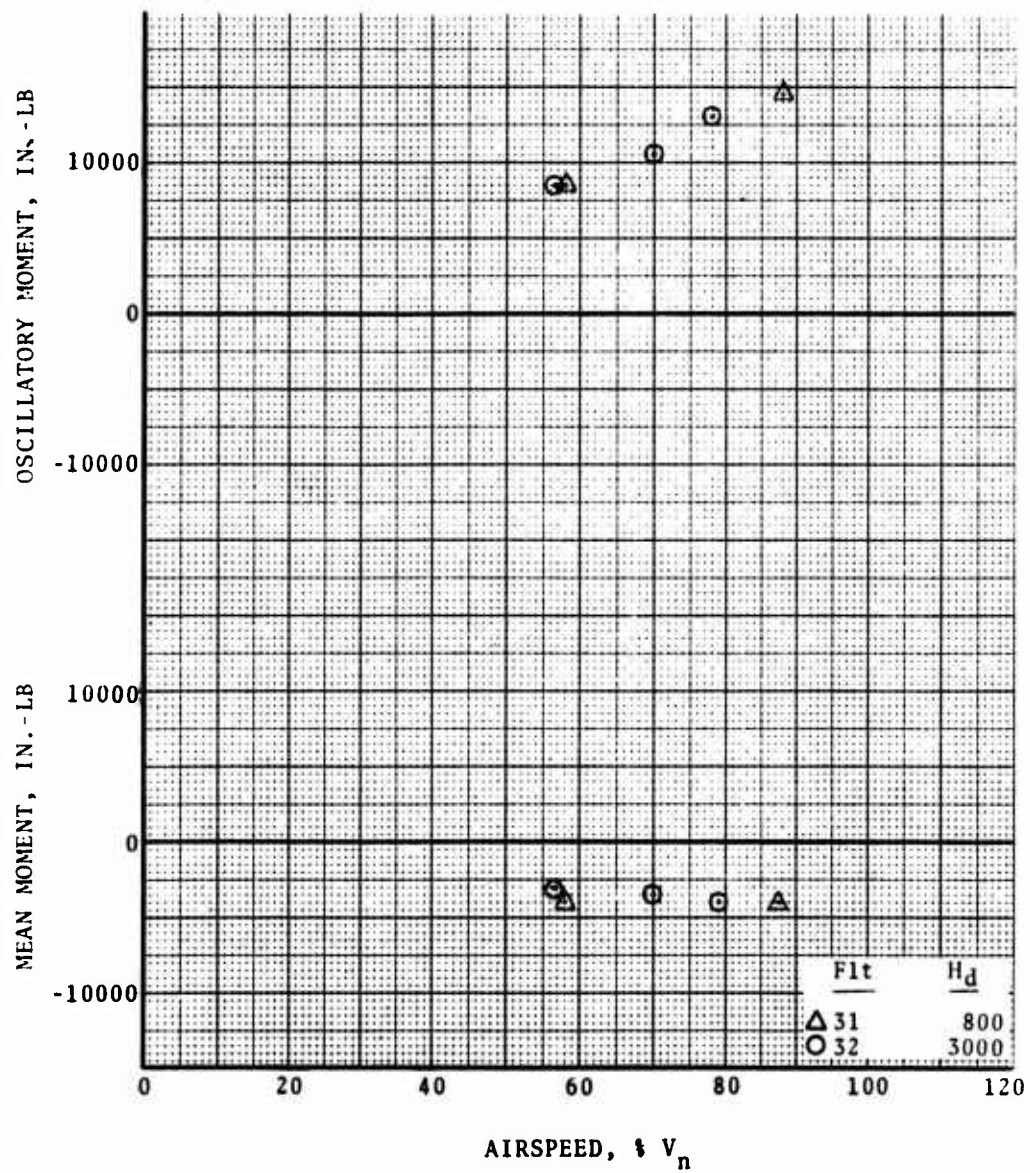
c) Flights 29 and 30, 9500-lb Gross Weight, and FWD C.G.

Figure C-1. (Cont'd).



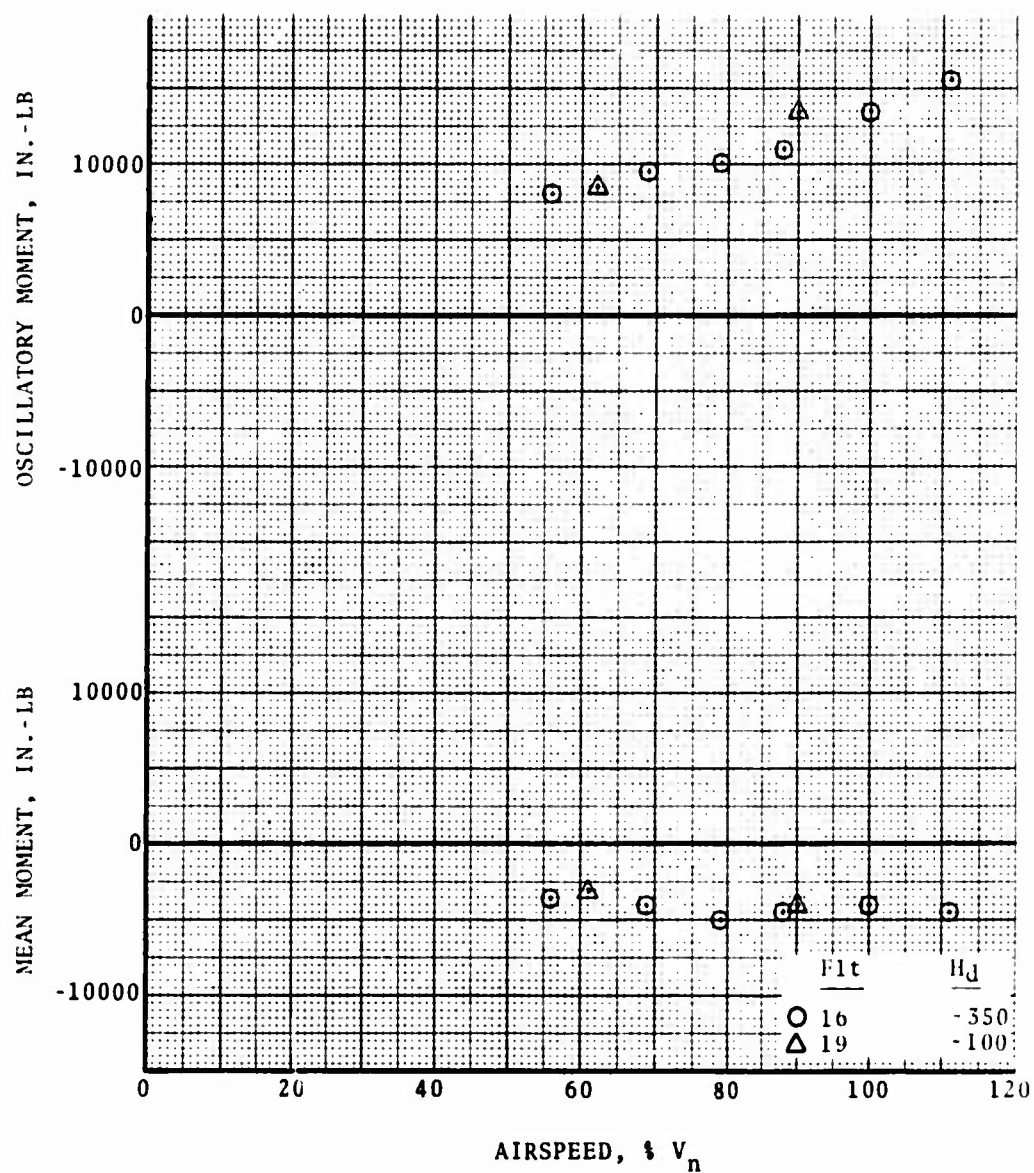
d) Flights 26 and 27, 8500-lb Gross Weight, and FWD C.G.

Figure C-1. (Cont'd)



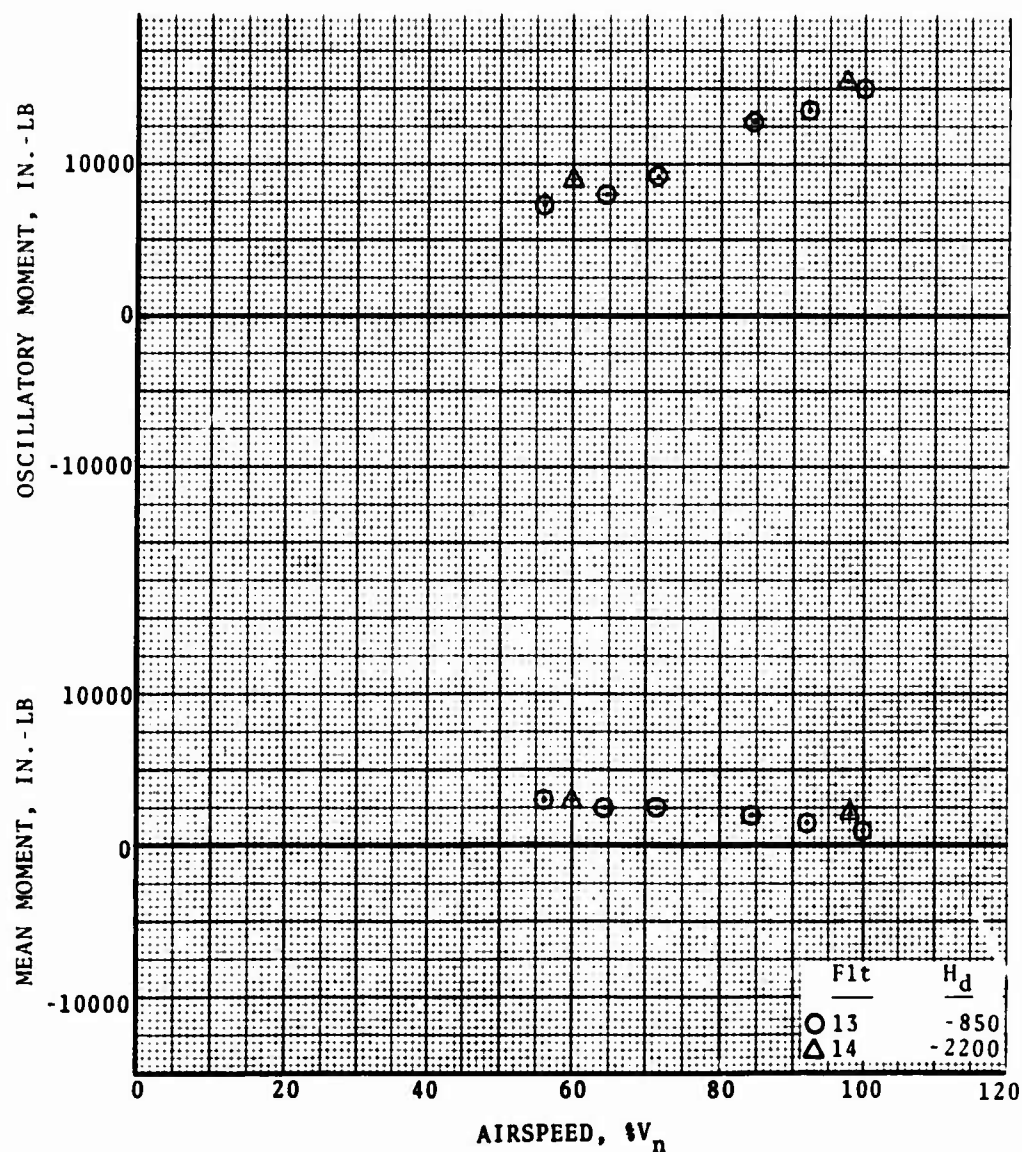
e) Flights 31 and 32, 8500-lb Gross Weight, and FWD C.G.

Figure C-1. (Cont'd)



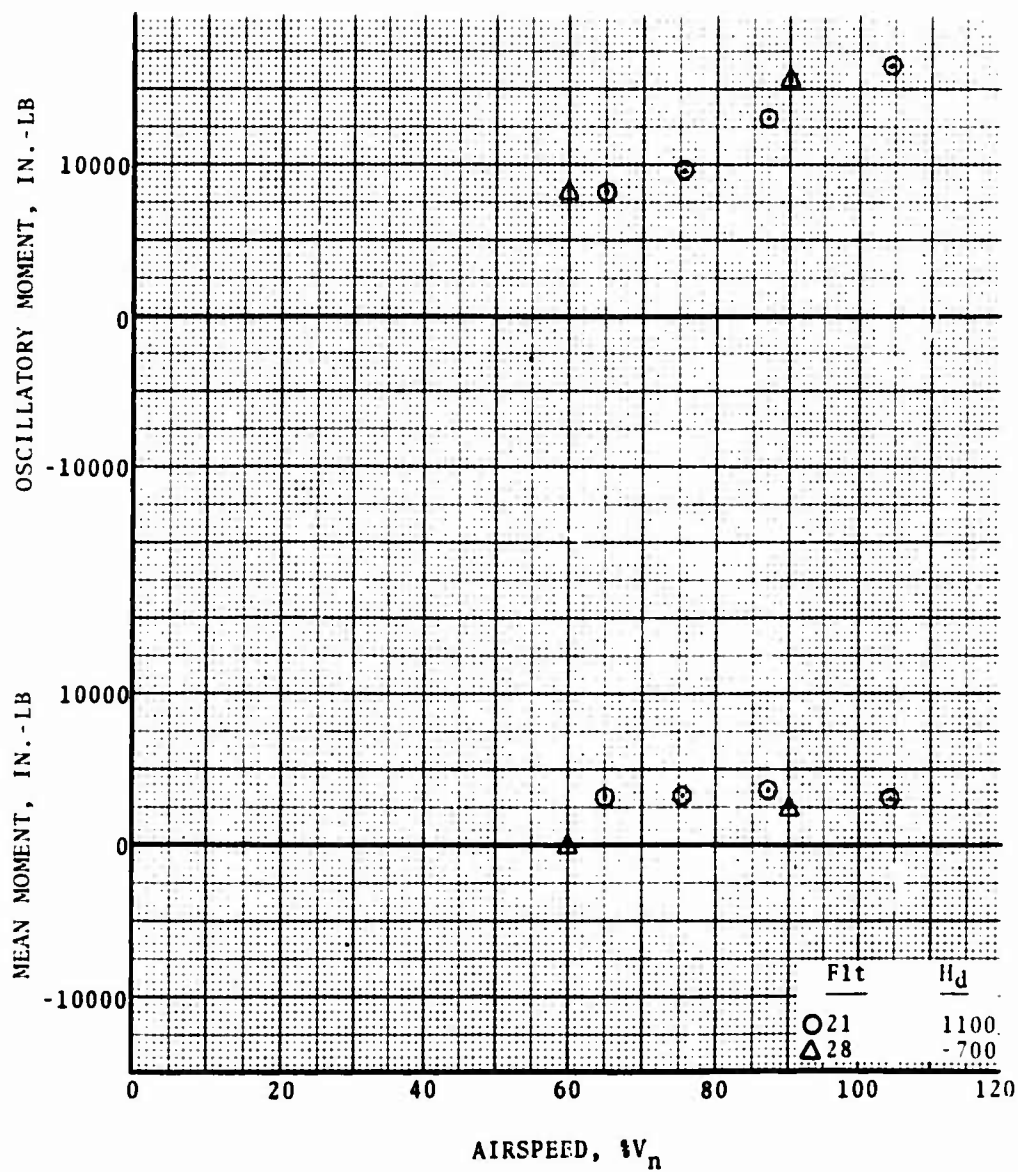
f) Flights 16 and 19, 8500-lb Gross Weight, and AFT C.G.

Figure C-1. (Concl'd)



a) Flights 13 and 14, 9500-lb Gross Weight and AFT C.G.

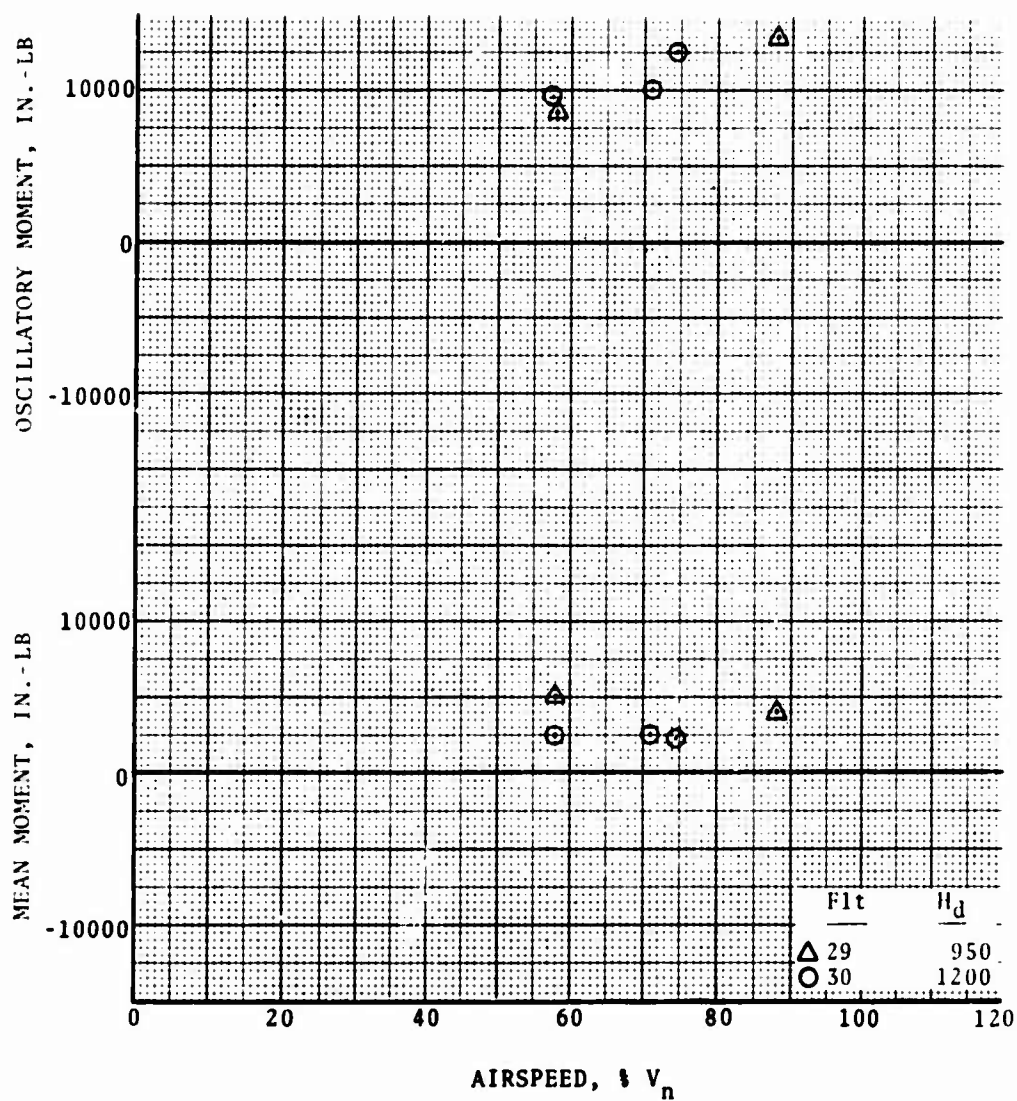
Figure C-2. Main Rotor Blade Beamwise Bending at Station 150 vs Airspeed for Various Density Altitudes by Flight, Gross Weight, and C.G. Position.



b) Flights 21 and 28, 9500-lb Gross Weight and FWD C.G.

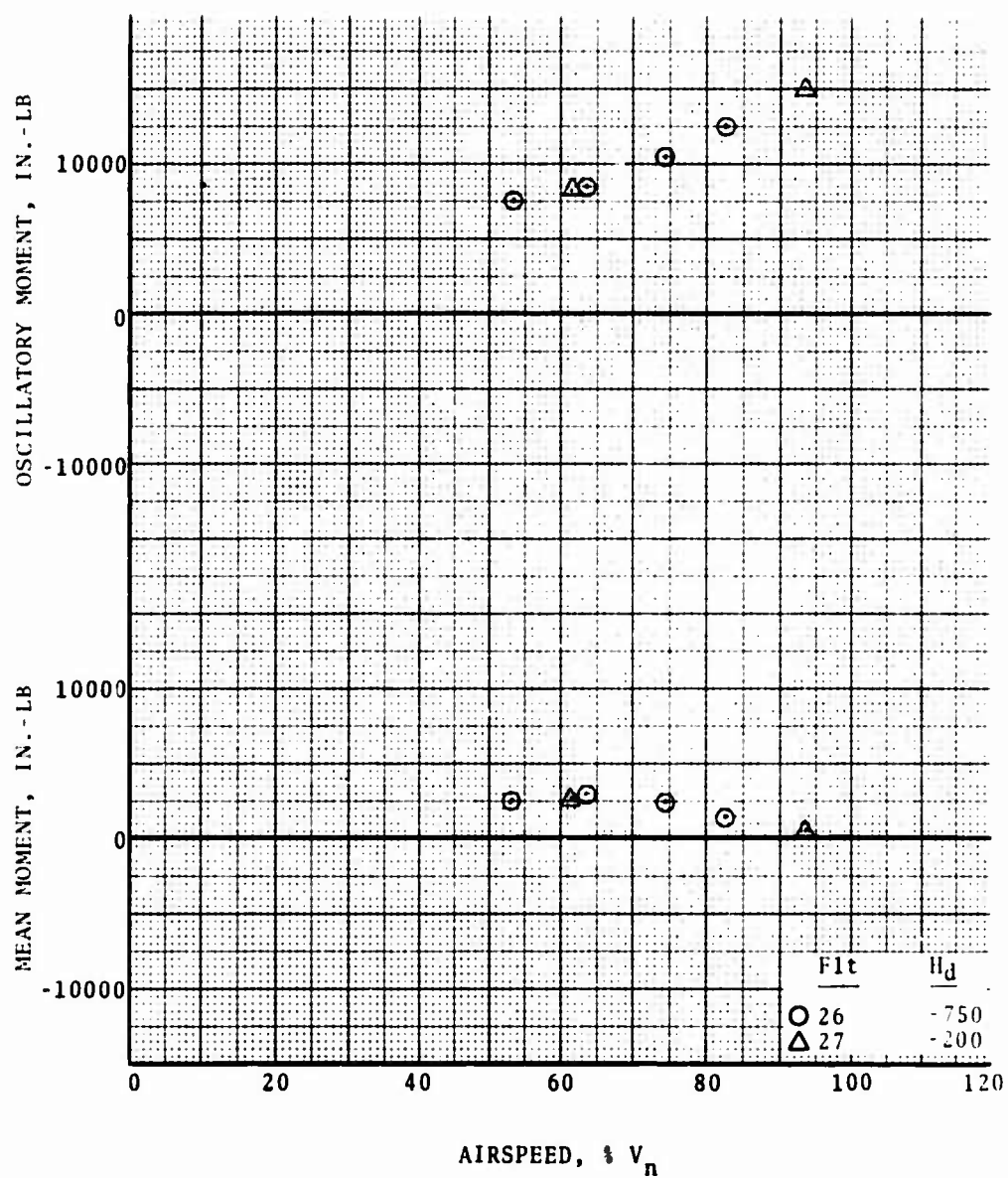
Figure C-2. (Cont'd)





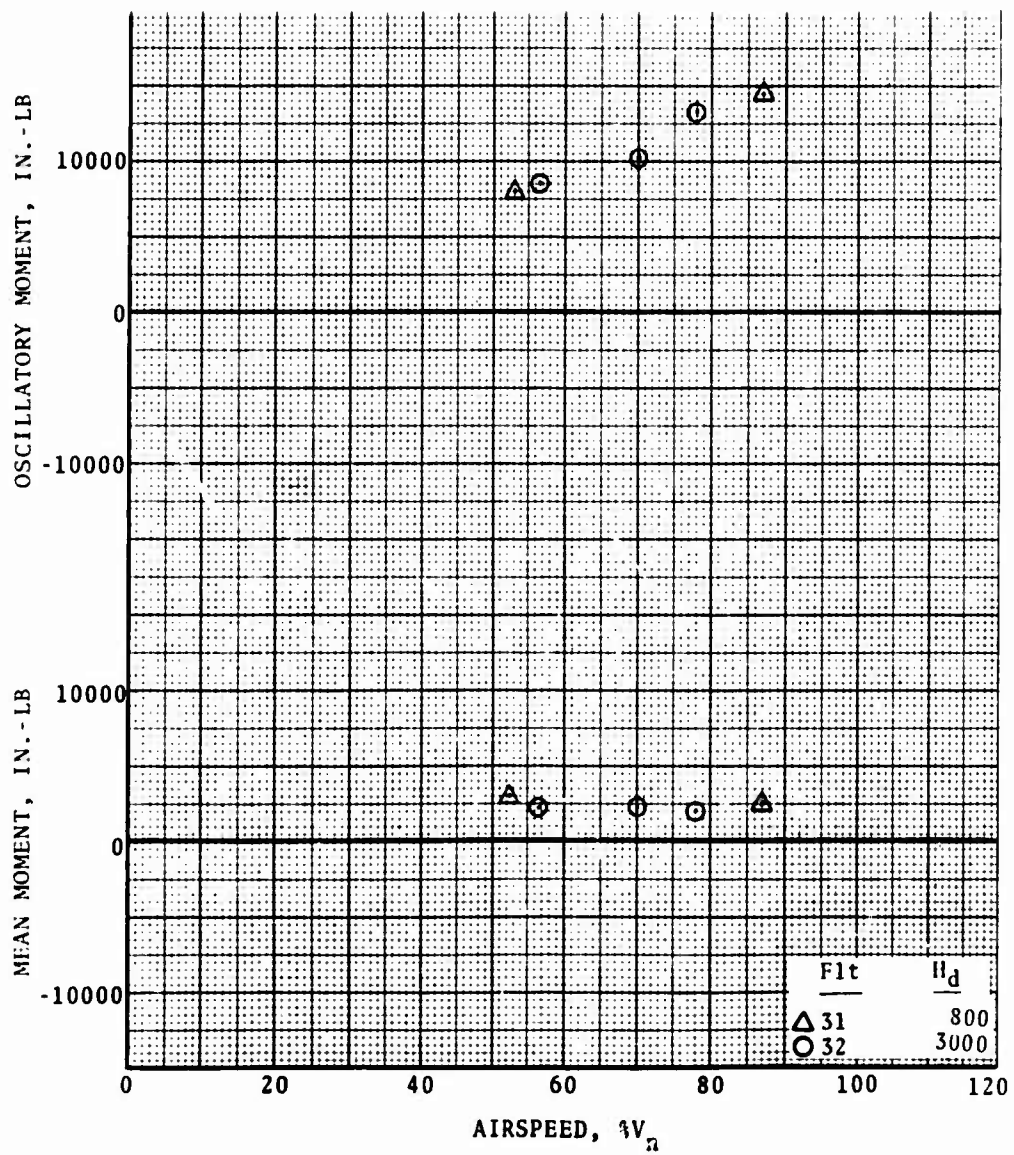
c) Flights 29 and 30, 9500-lb Gross Weight and FWD C.G.

Figure C-2. (Cont'd)



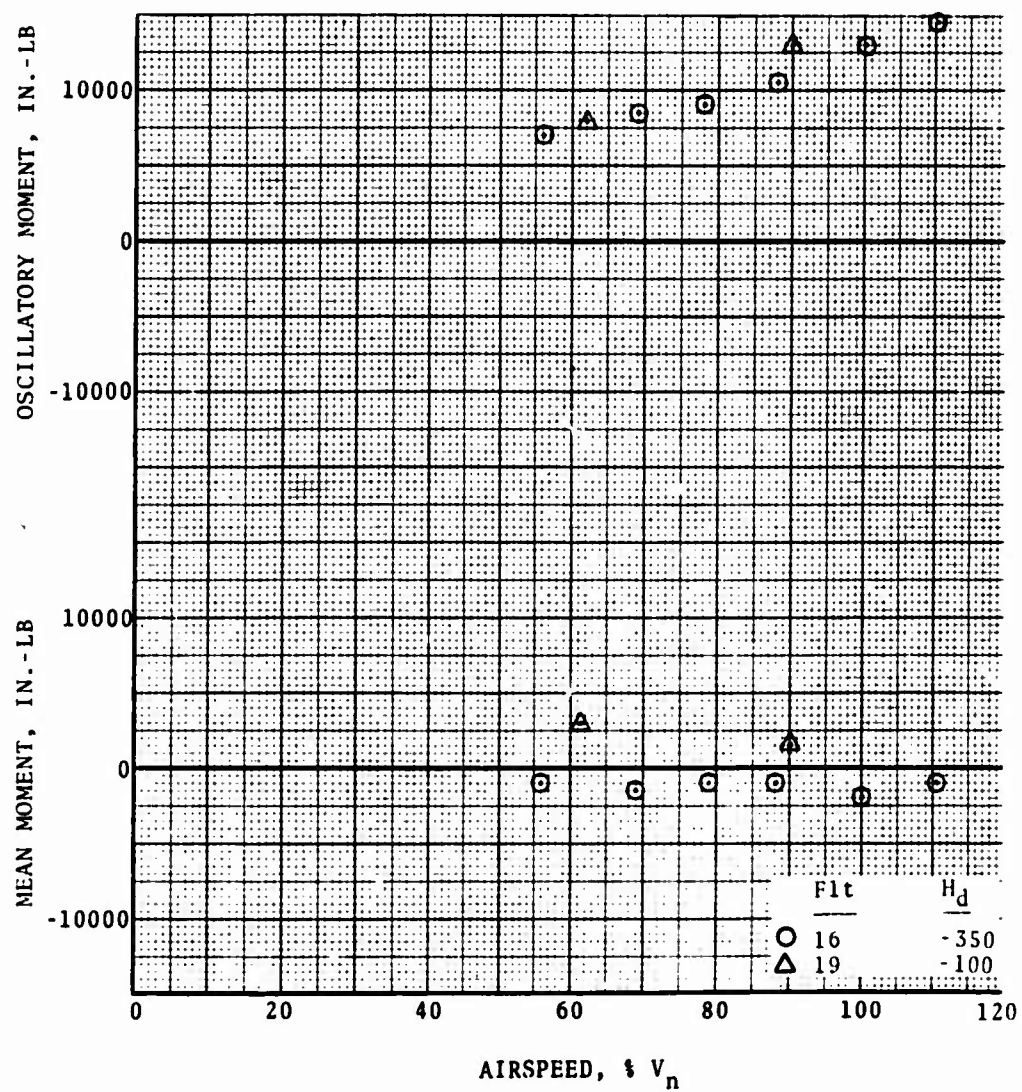
d) Flights 26 and 27, 8500-lb Gross Weight and FWD C.G.

Figure C-2. (Cont'd)



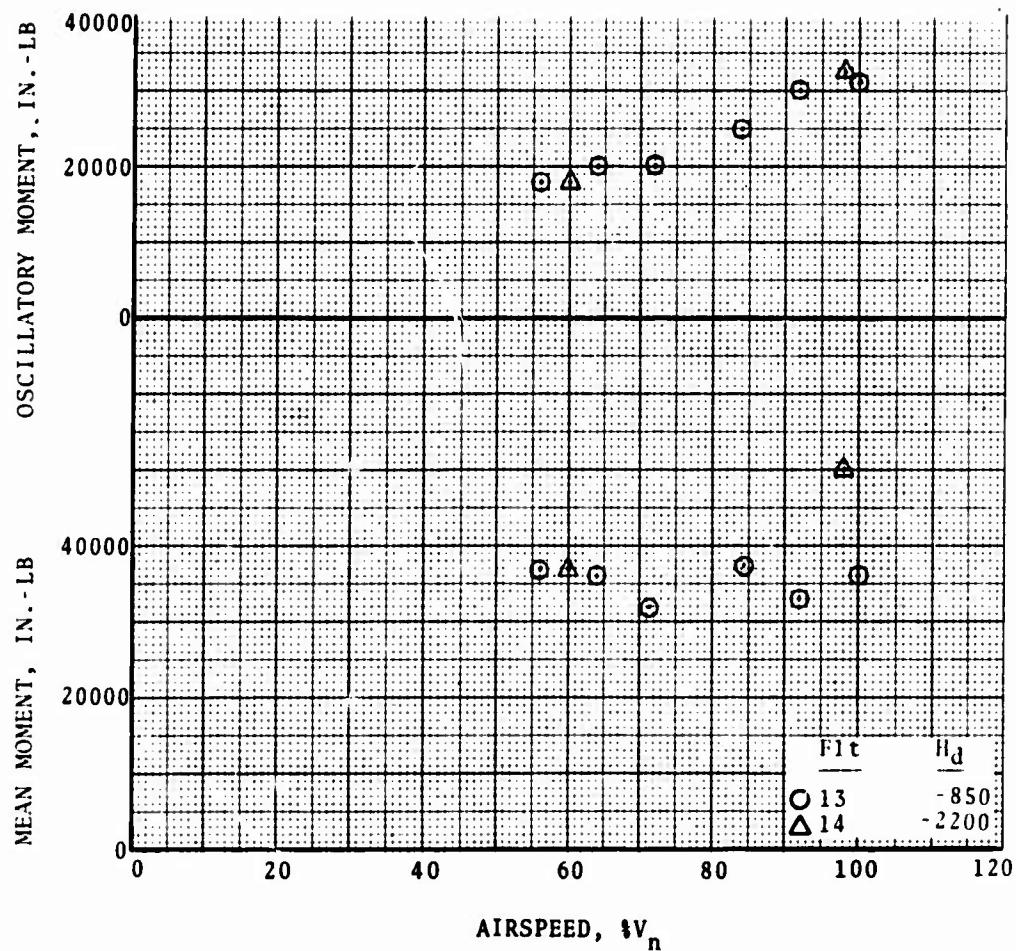
e) Flights 31 and 32, 8500-lb Gross Weight and FWD C.G.

Figure C-2. (Cont'd)



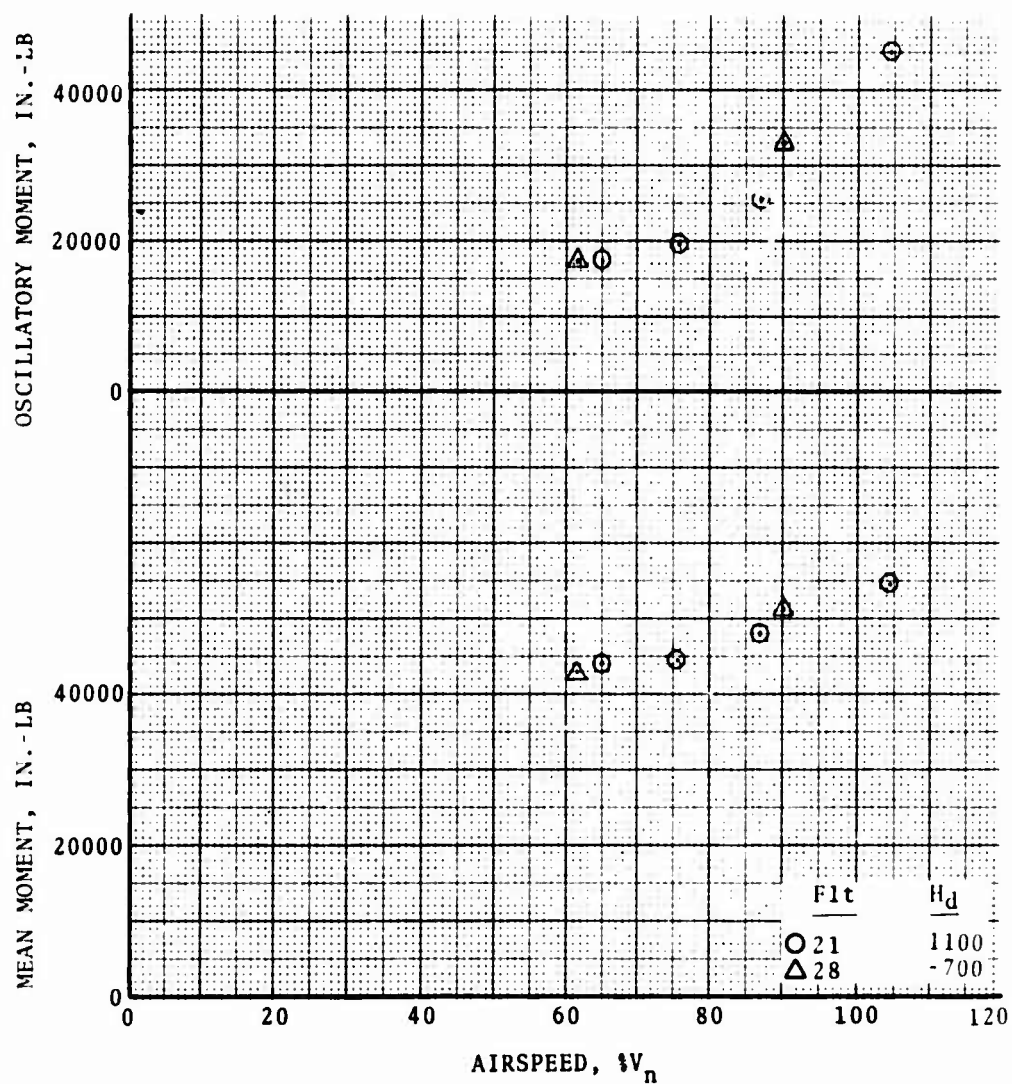
f) Flights 16 and 19, 8500-lb Gross Weight, and AFT C.G.

Figure C-2. (Concl'd)



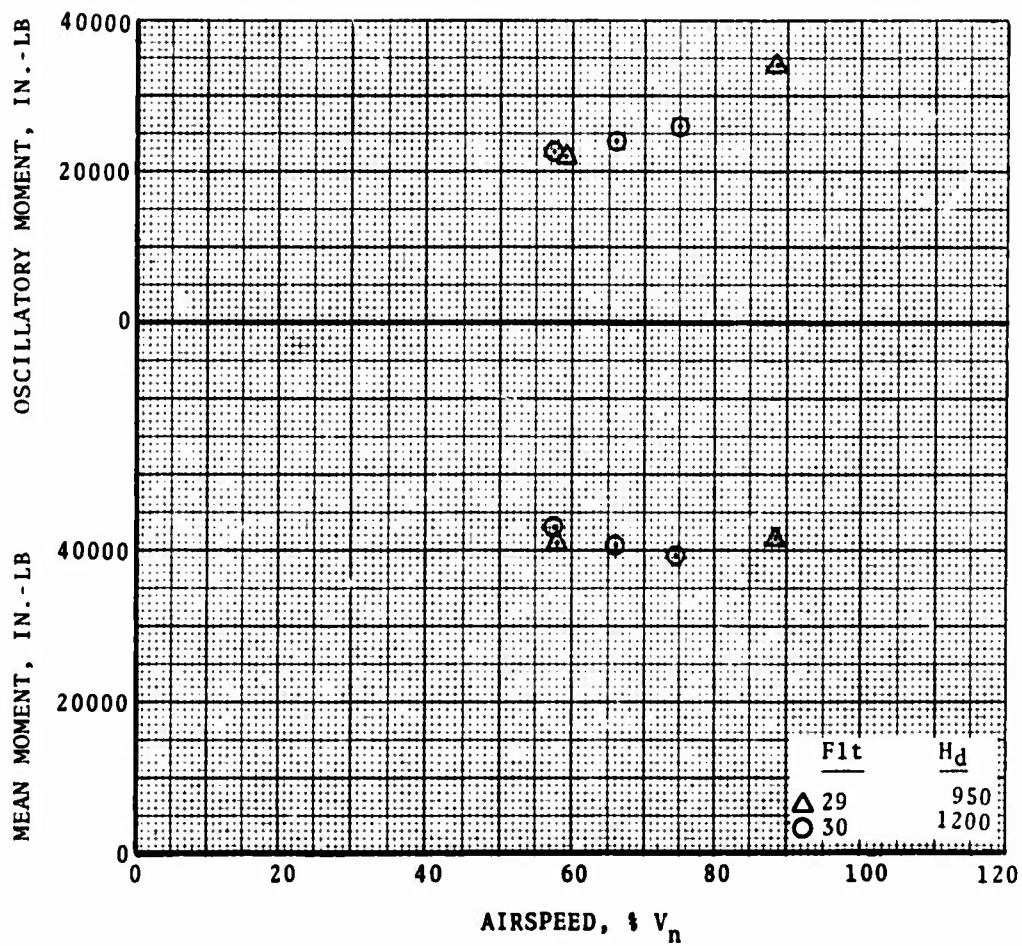
a) Flights 13 and 14, 9500-lb Gross Weight, and AFT C.G.

Figure C-3. Main Rotor Blade Beamwise Bending at Station 35 vs Airspeed for Various Density Altitudes by Flight, Gross Weight, and C.G. Position.



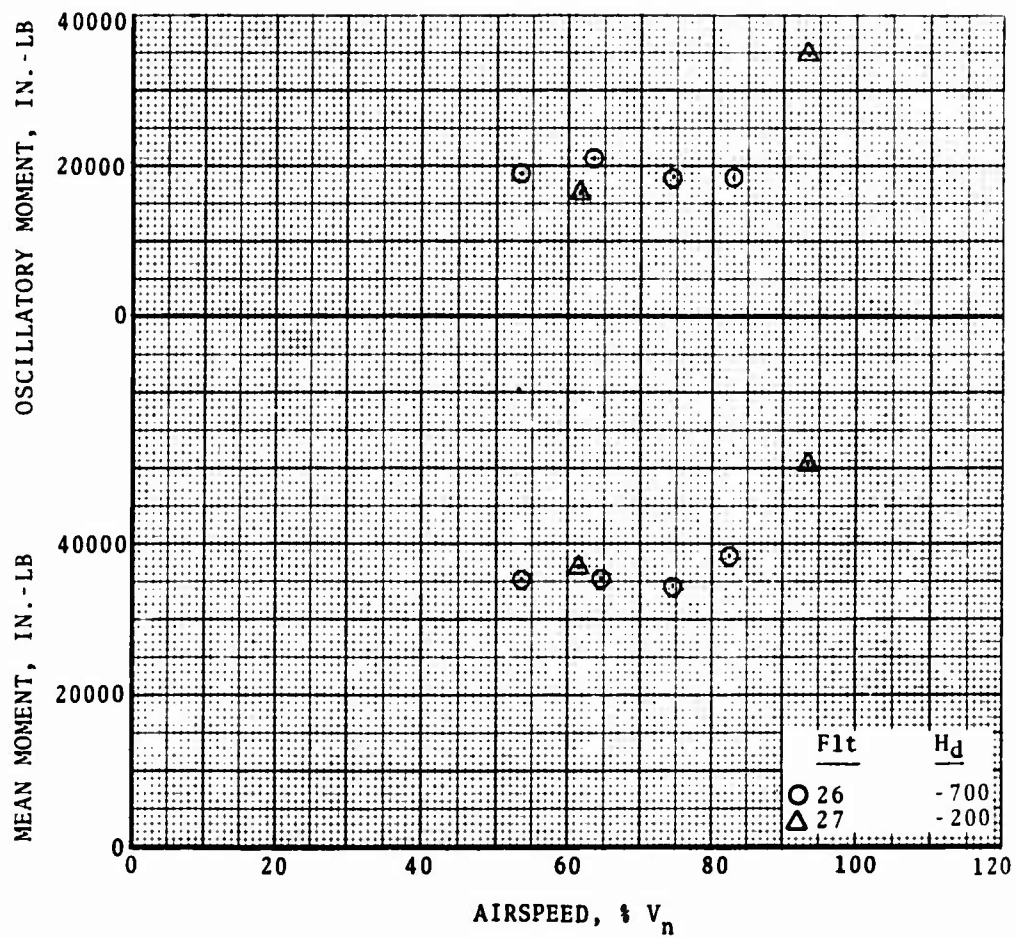
b) Flights 21 and 28, 9500-lb Gross Weight, and FWD C.G.

Figure C-3. (Cont'd)



c) Flights 29 and 30, 9500-lb Gross Weight, and FWD C.G.

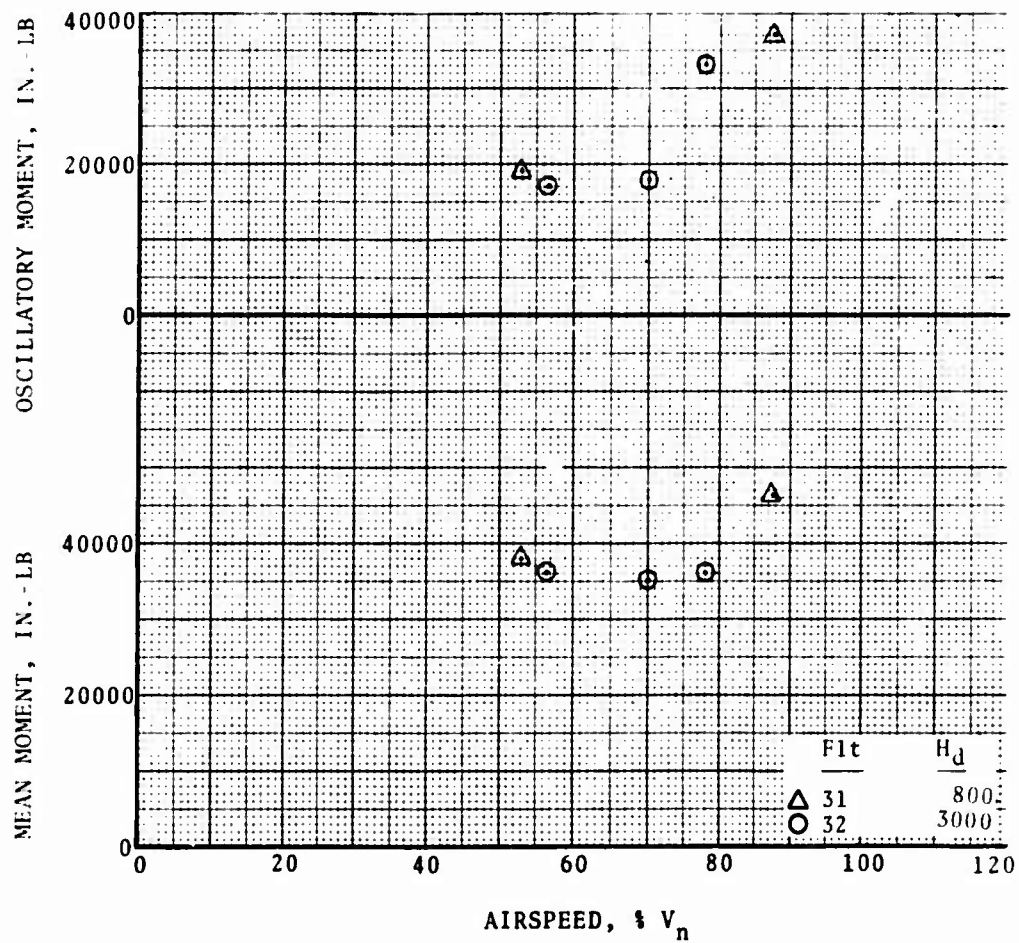
Figure C-3. (Cont'd)



d) Flights 26 and 27, 8500-lb Gross Weight, and FWD C.G.

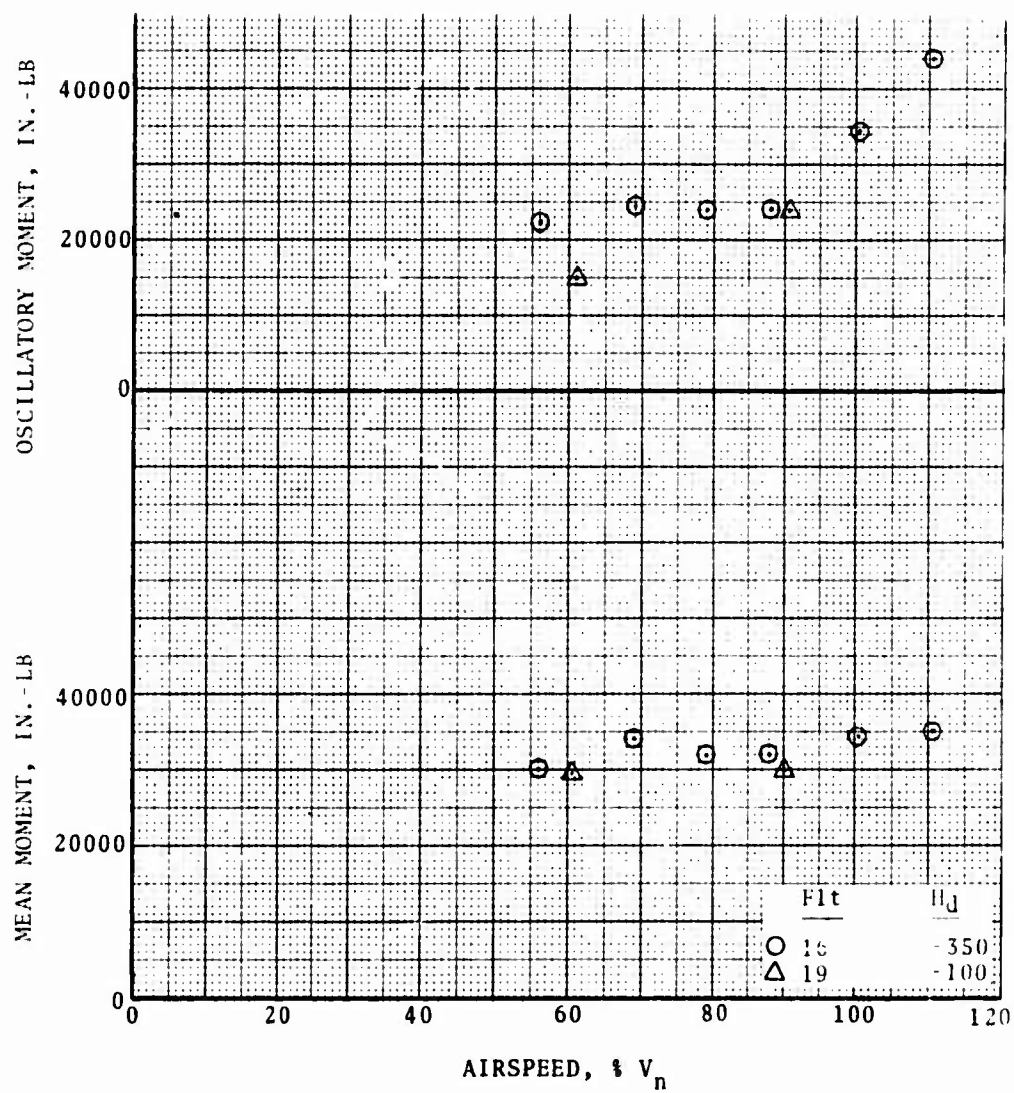
Figure C-3. (Cont'd)





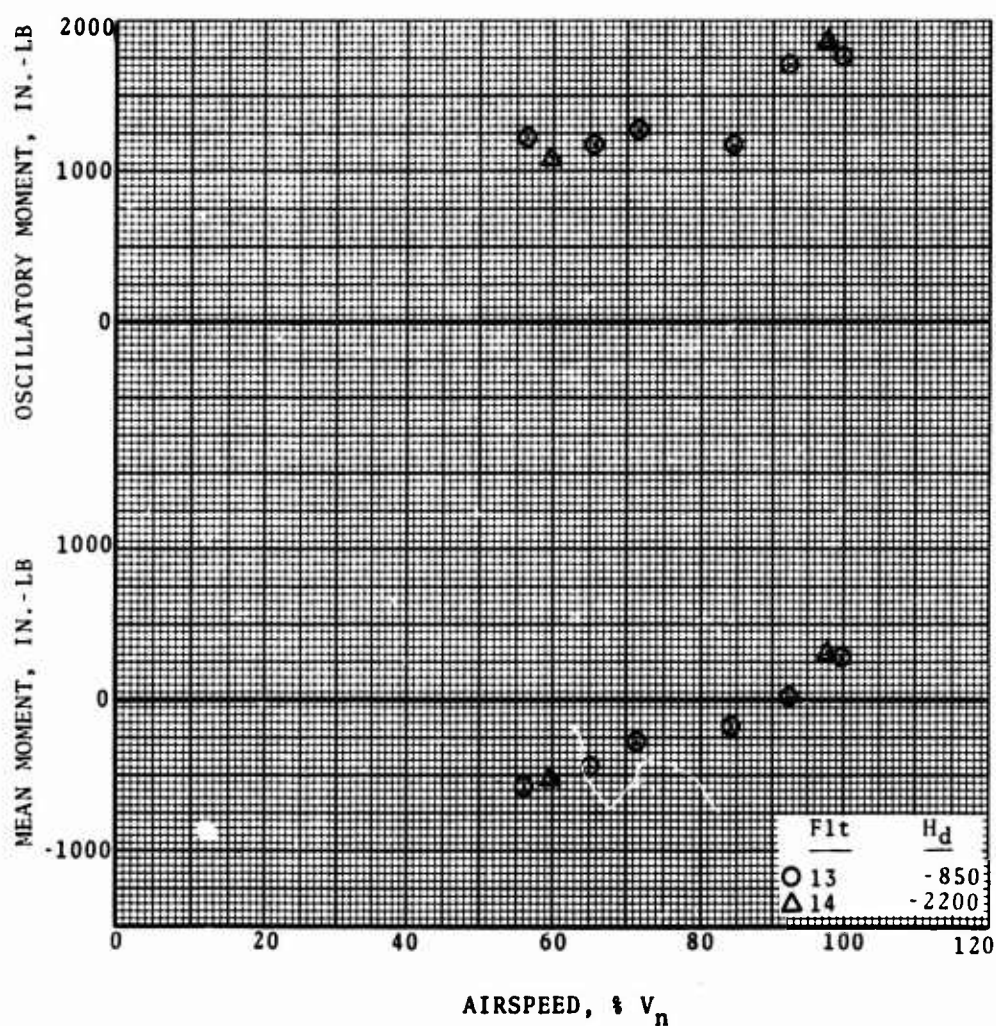
e) Flights 31 and 32, 8500-lb Gross Weight, and FWD C.G.

Figure C-3. (Cont'd)



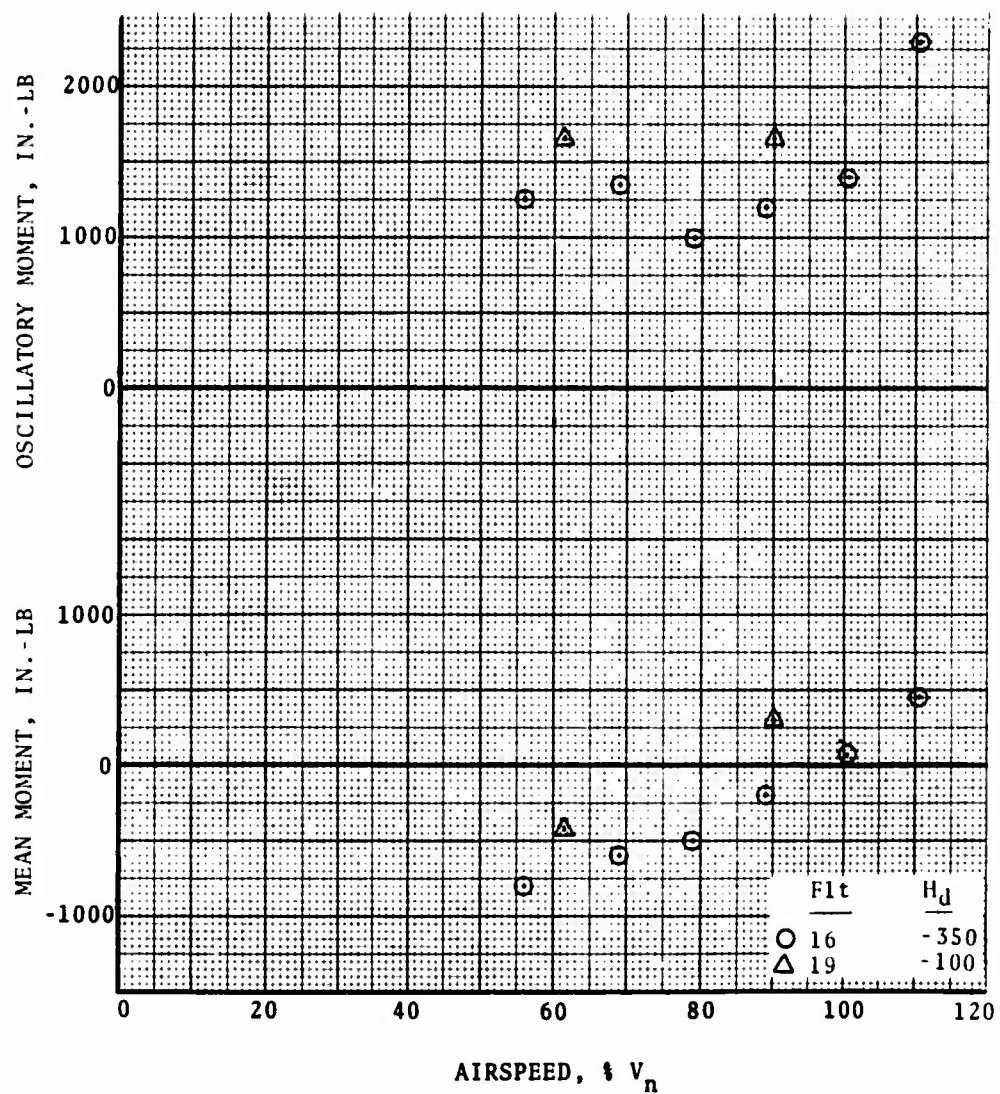
f) Flights 16 and 19, 8500-lb Gross Weight, and AFT C.G.

Figure C-3. (Concl'd)



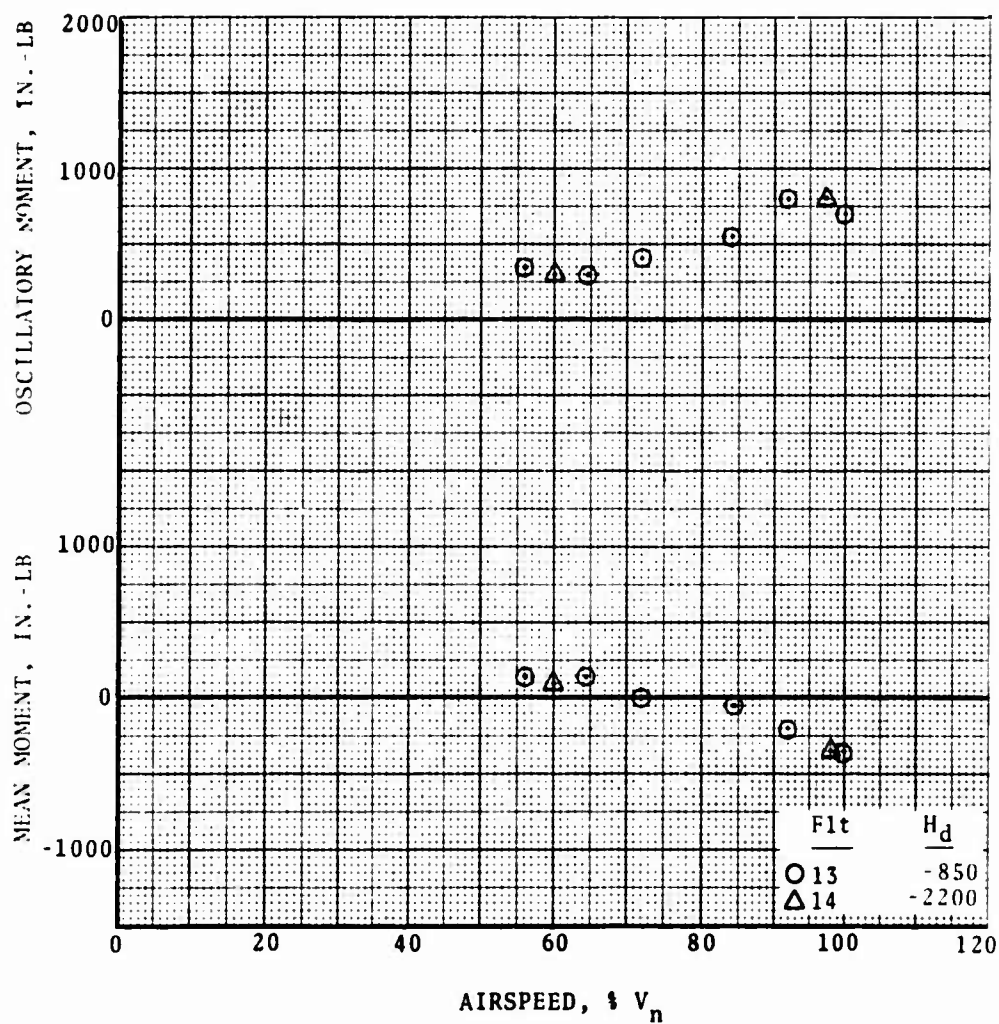
a) Flights 13 and 14, 9500-lb Gross Weight, and AFT C.G.

Figure C-4. Tail Rotor Blade Beamwise Bending at Station 21.5 vs Airspeed for Various Density Altitudes by Flight, Gross Weight, and C.G. Position.



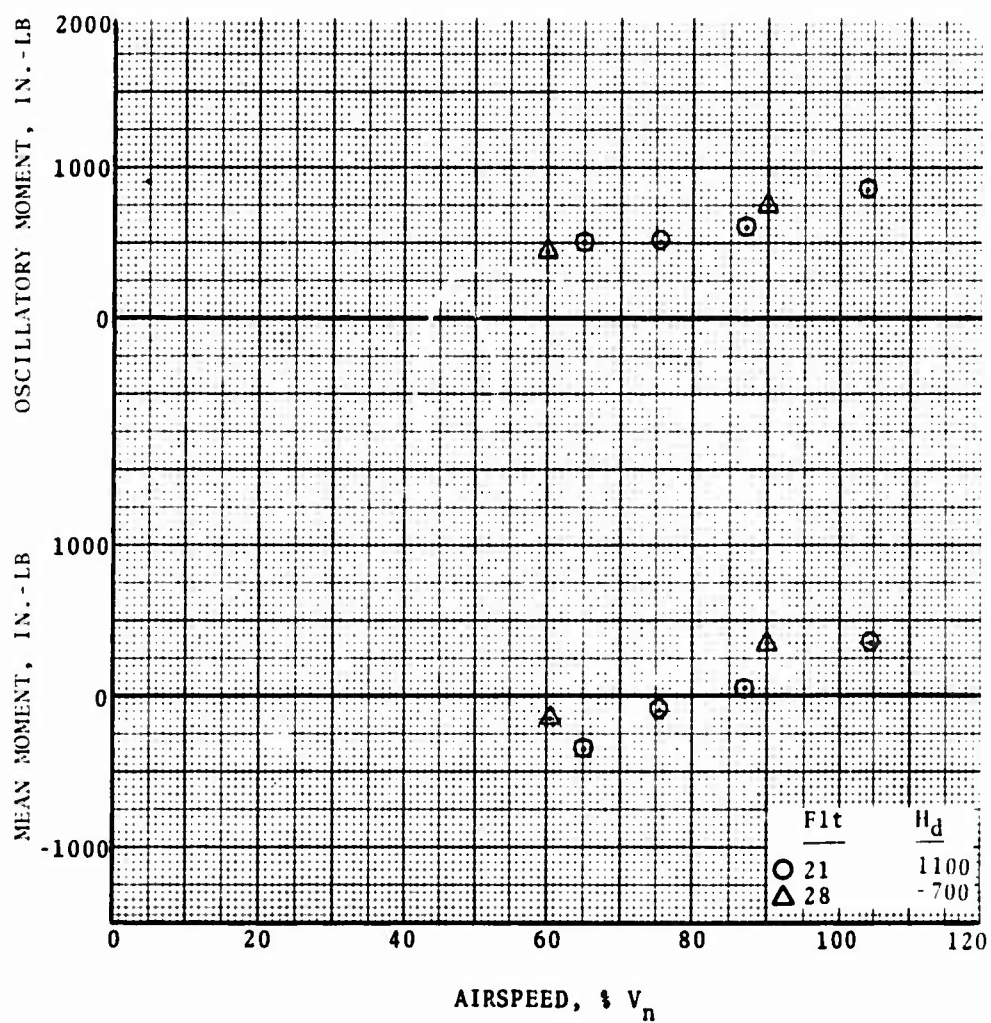
b) Flights 16 and 19, 8500-lb Gross Weight, and AFT C.G.

Figure C-4. (Concl'd)



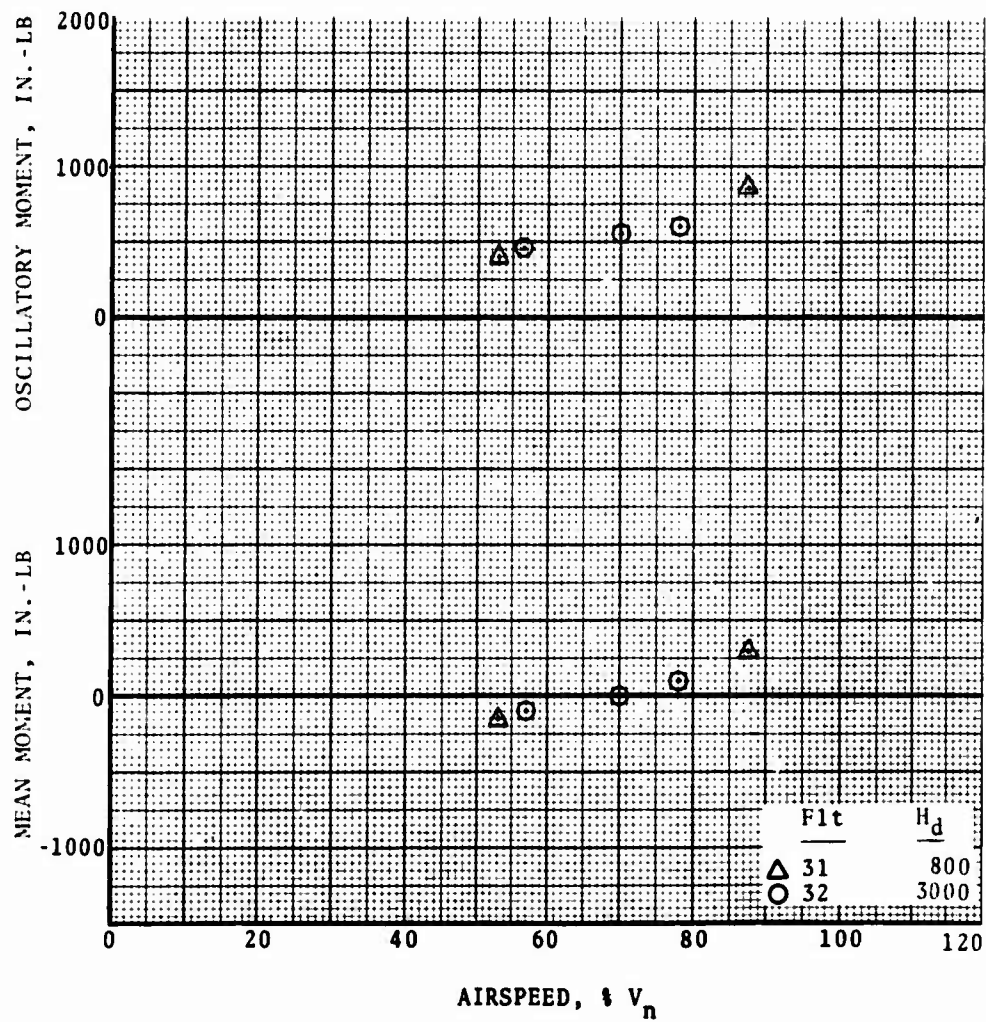
a) Flights 13 and 14, 9500-lb Gross Weight, and AFT C.G.

Figure C-5. Tail Rotor Blade Beamwise Bending at Station 11.0 vs Airspeed for Various Density Altitudes by Flight, Gross Weight, and C.G. Position.



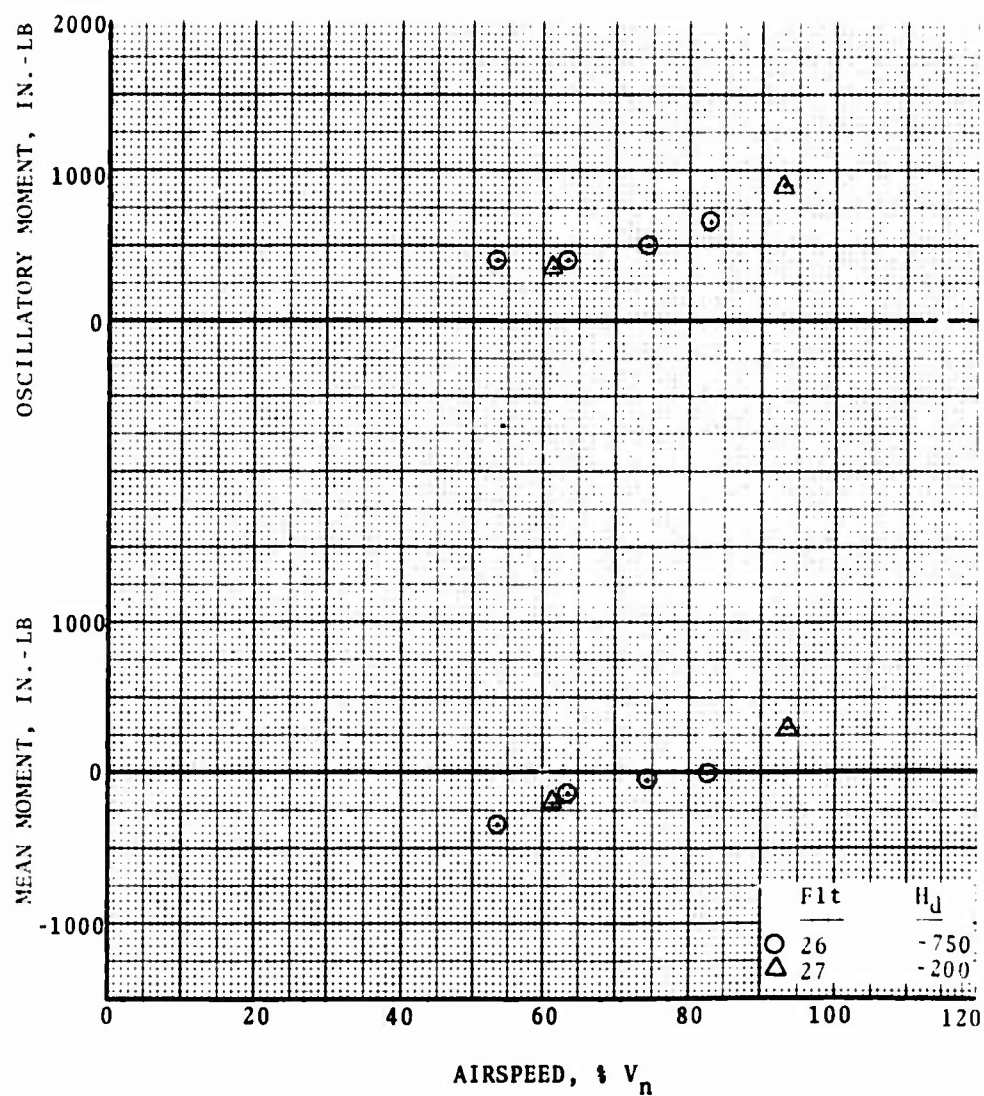
b) Flights 21 and 28, 9500-lb Gross Weight, and FWD C.G.

Figure C-5. (Cont'd)



c) Flights 31 and 32, 8500-lb Gross Weight, and FWD C.G.

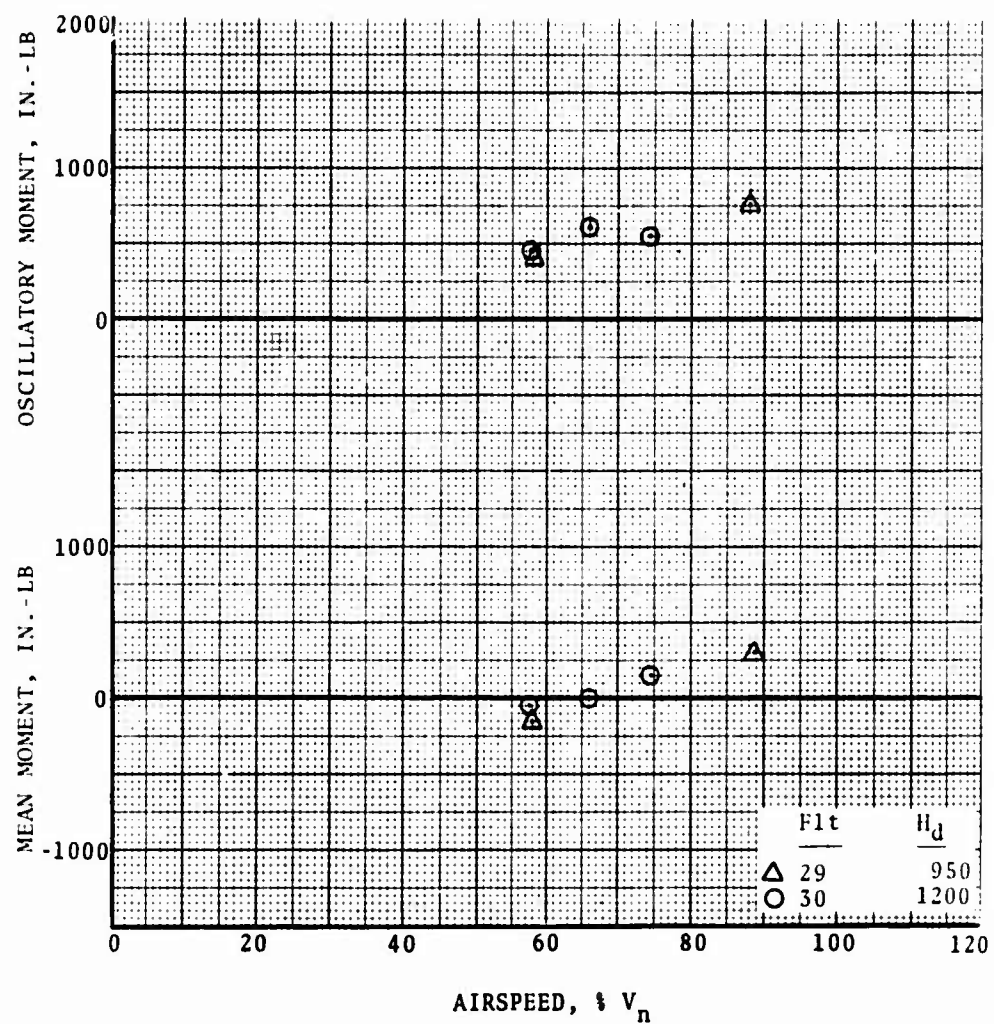
Figure C-5. (Cont'd)



d) Flights 26 and 27, 8500-lb Gross Weight, and FWD C.G.

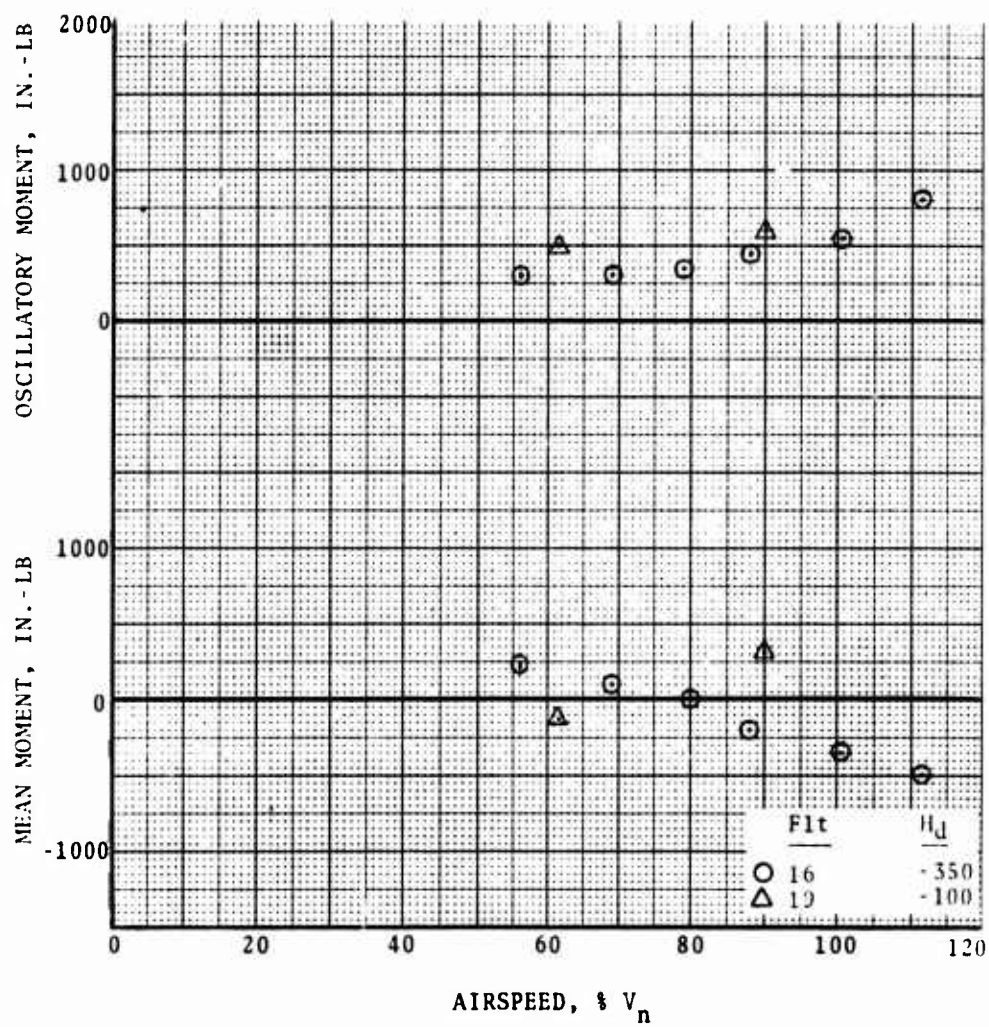
Figure C-5. (Cont'd)





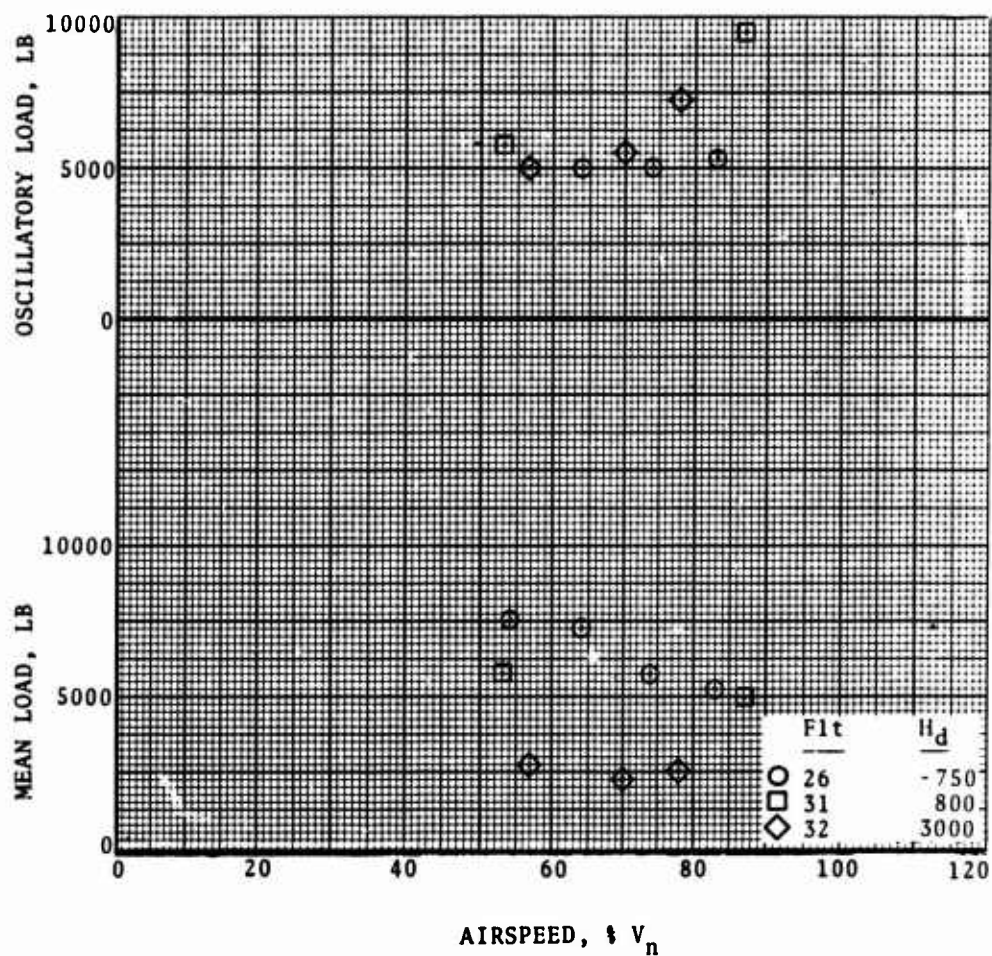
e) Flights 29 and 30, 9500-lb Gross Weight, and FWD C.G.

Figure C-5. (Cont'd)



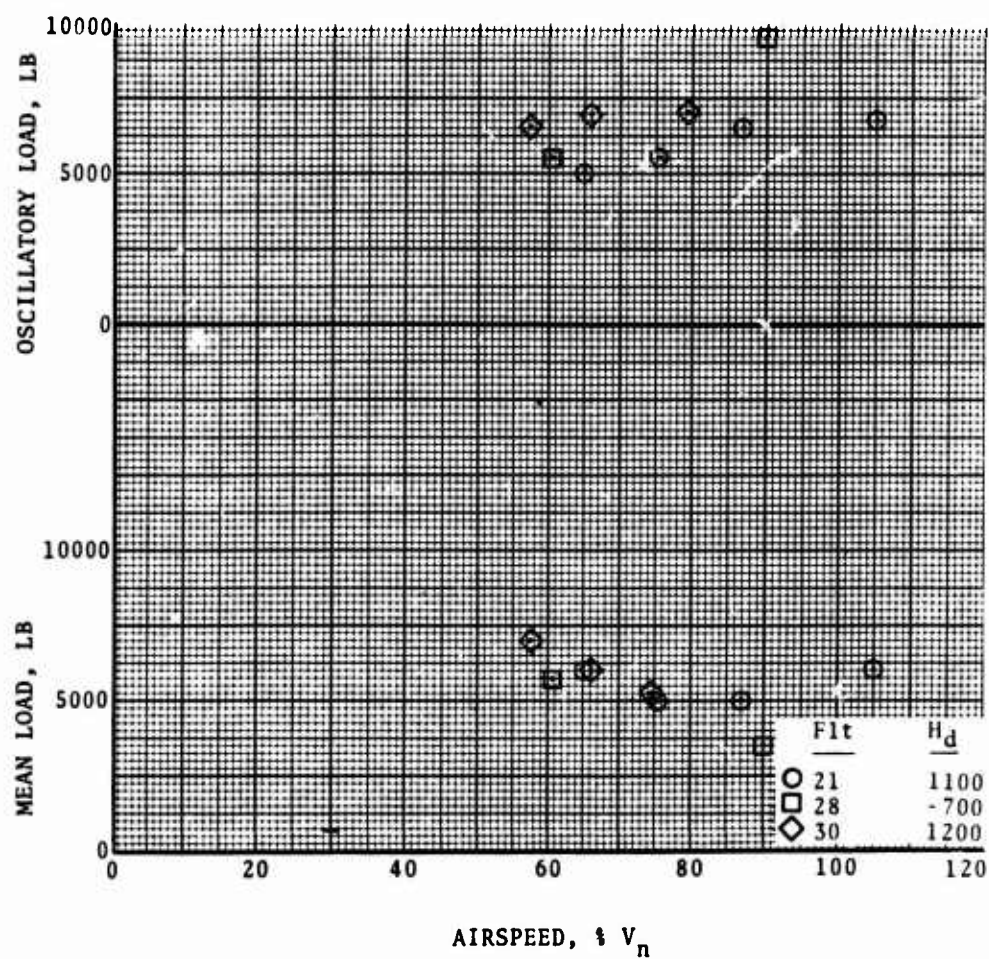
f) Flights 16 and 19, 8500-lb Gross Weight, and AFT C.G.

Figure C-5. (Concl'd)



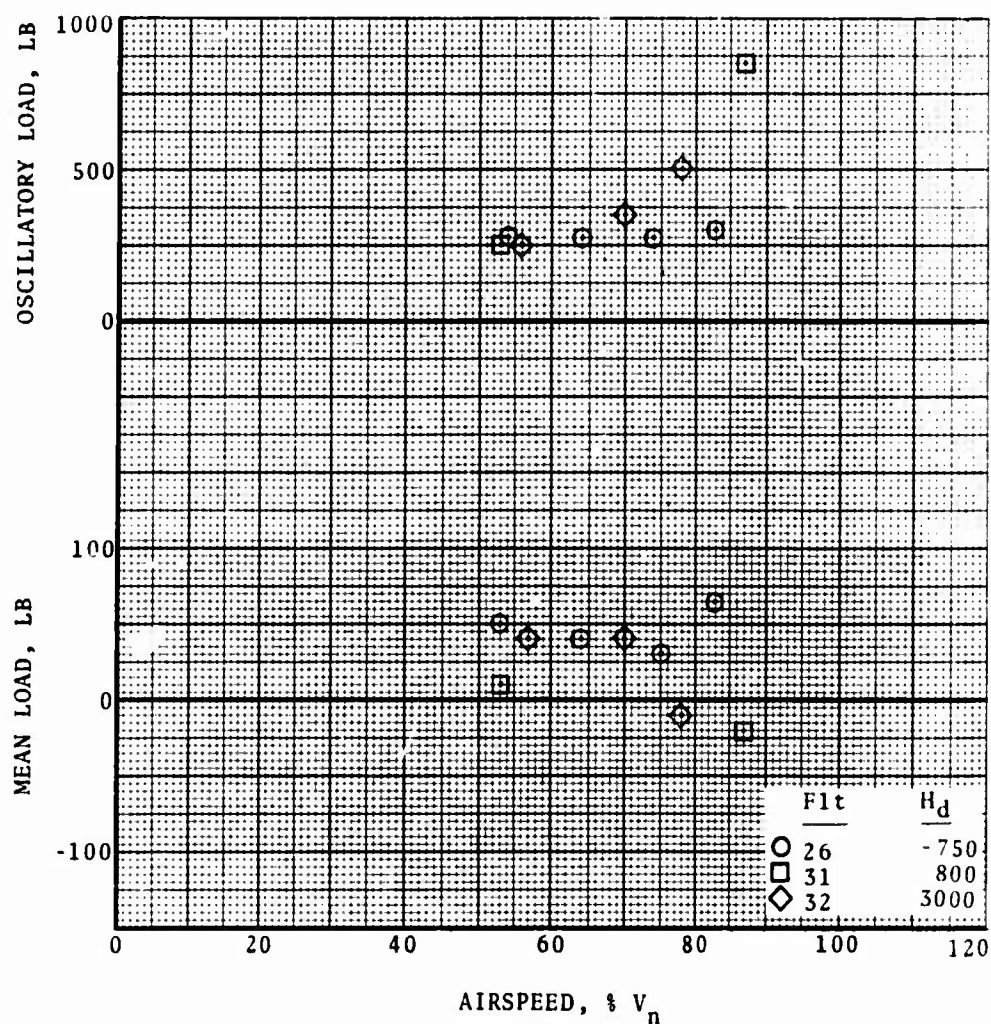
a) Flights 26, 31, and 32, and 8500-1b Gross Weight

Figure C-6. Drag Brace Load vs Airspeed for FWD C.G. and Various Density Altitudes by Flight and Gross Weight.



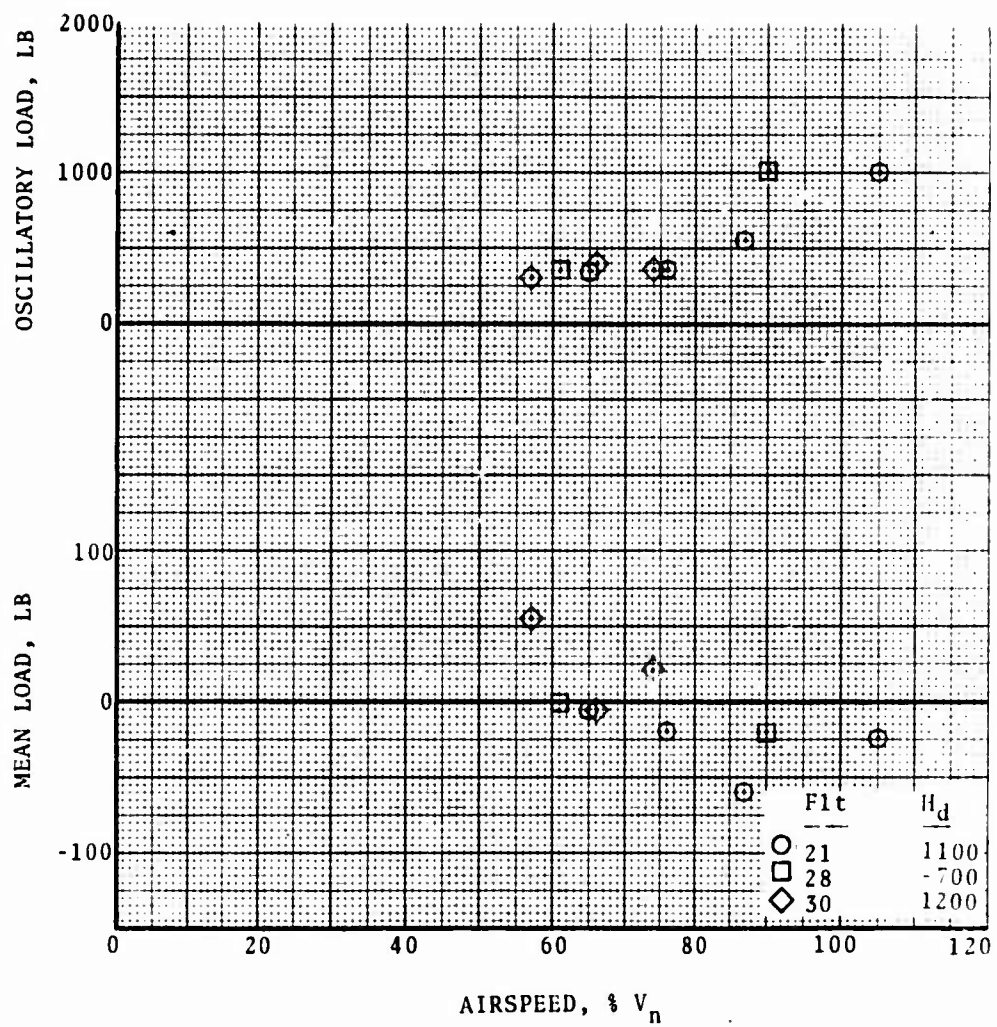
b) Flights 21, 28, and 30, and 9500-lb Gross Weight

Figure C-6. (Concl'd)



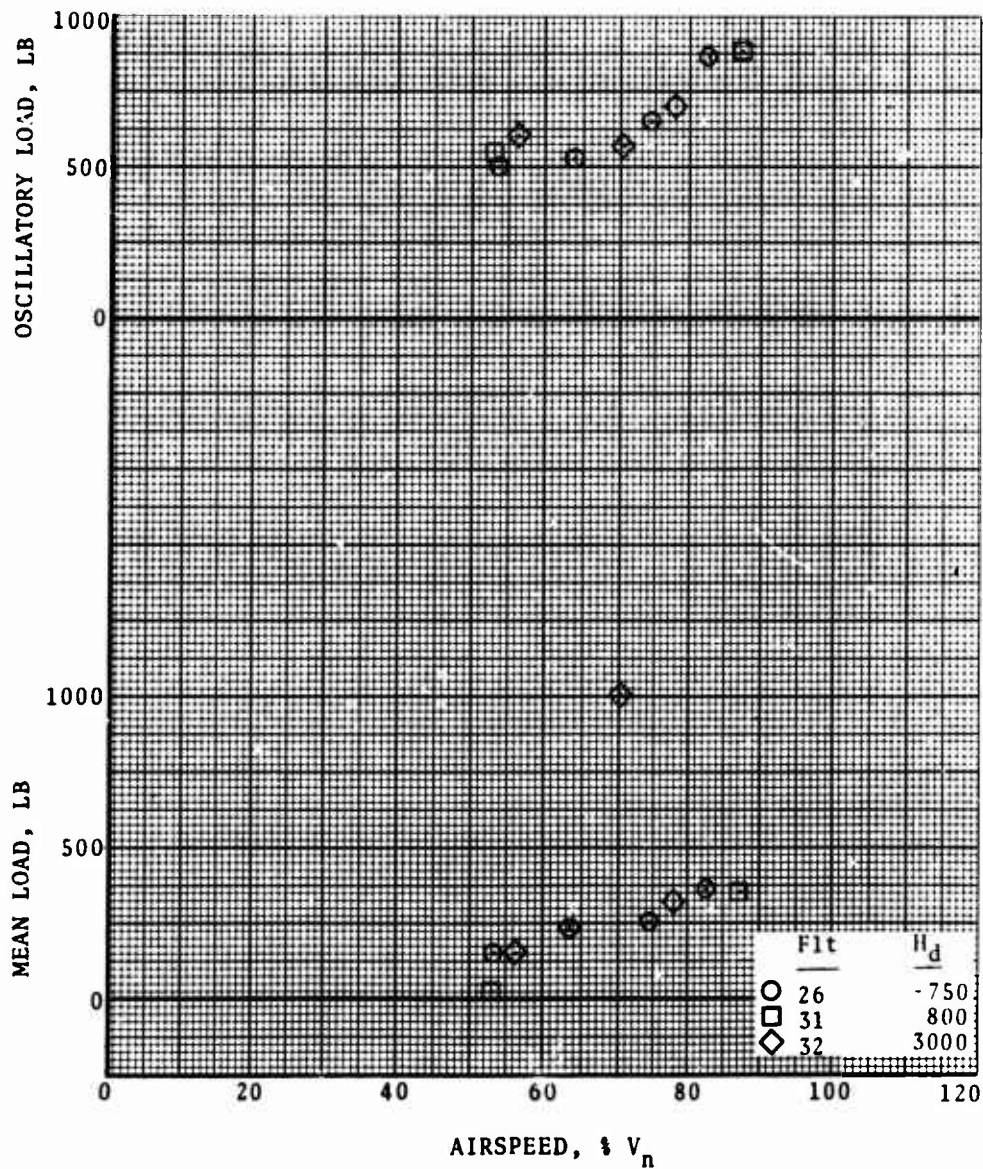
a) Flights 26, 31 and 32 and 8500-lb Gross Weight

Figure C-7. Scissors Tube Load vs Airspeed for FWD C.G. and Various Density Altitudes by Flight and Gross Weight.



b) Flights 21, 28, and 30 and 9500-lb Gross Weight

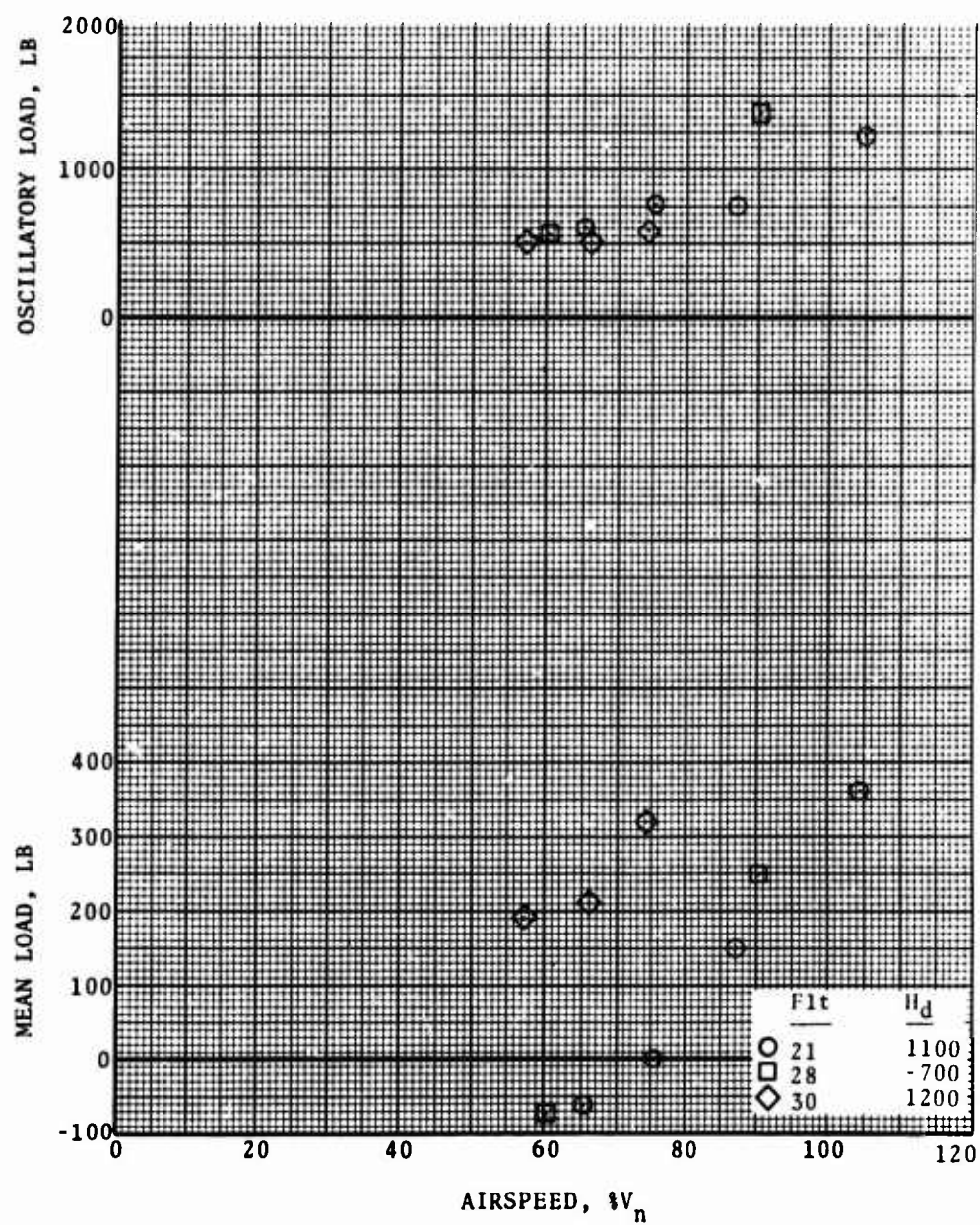
Figure C-7. (Concl'd)



a) Flights 26, 31 and 32, 8500-lb Gross Weight

Figure C-8. Longitudinal Boost Tube Load vs Airspeed for FWD C.G. and Various Density Altitudes by Flight and Gross Weight.

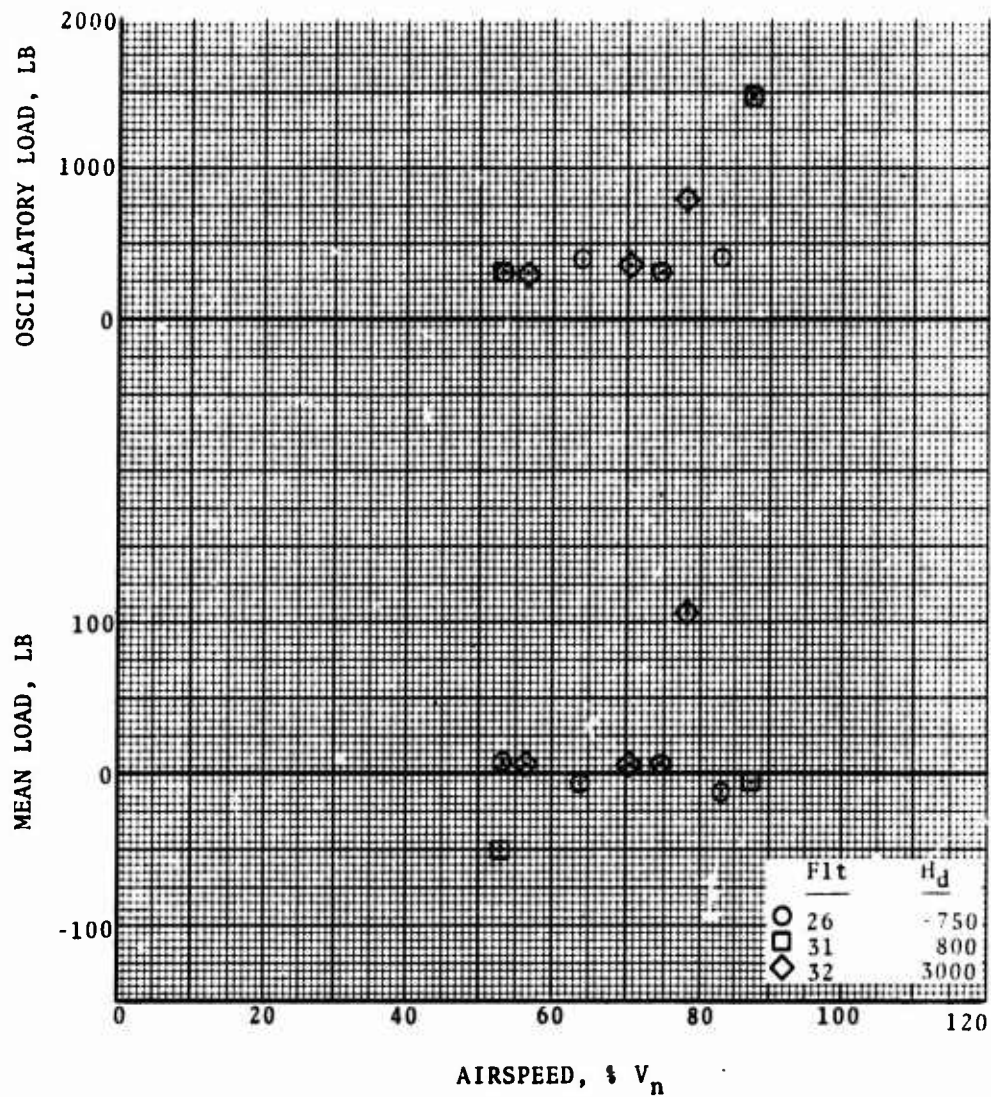




b) Flights 21, 28 and 30, 9500-lb Gross Weight

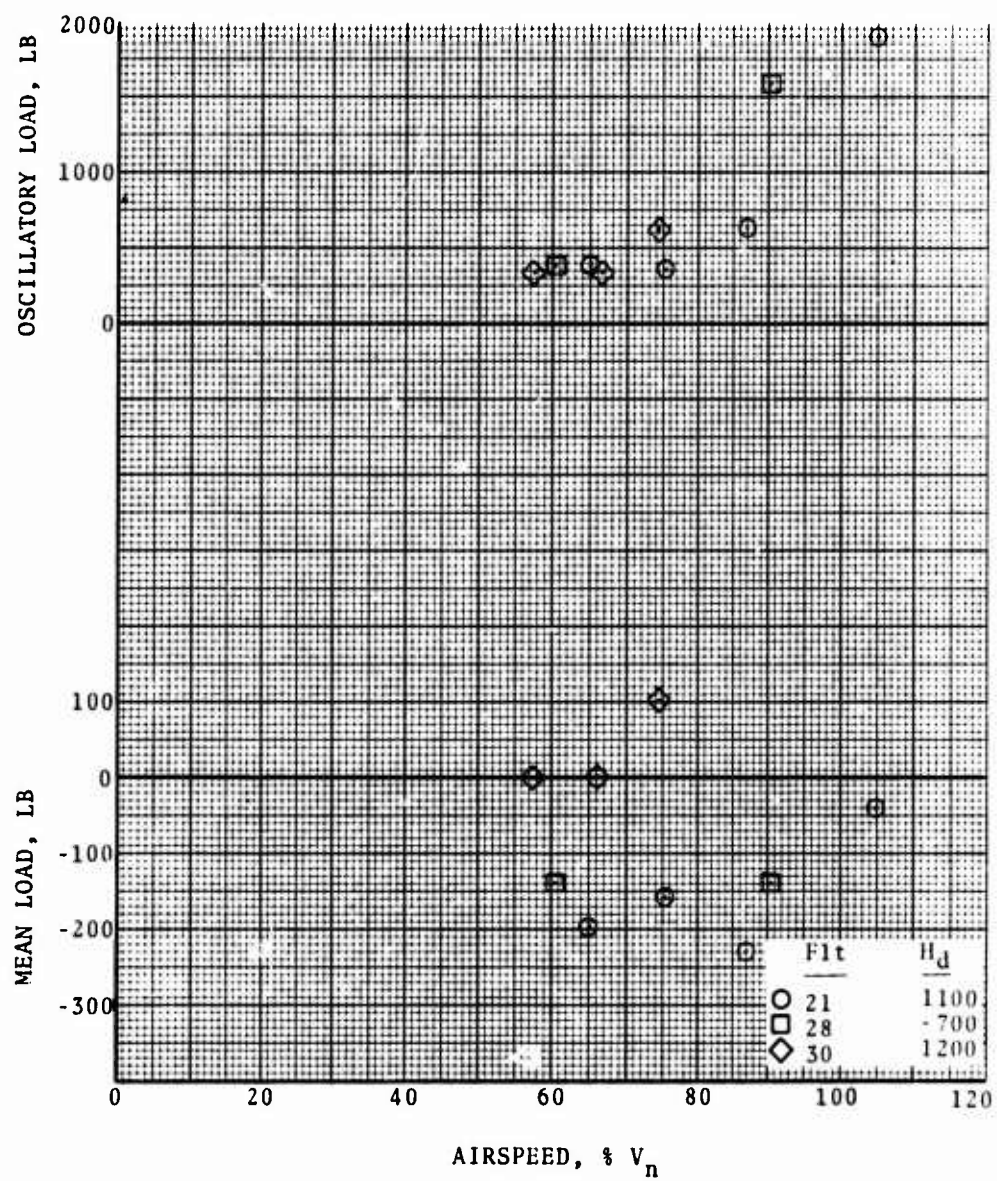
Figure C-8. (Concl'd)





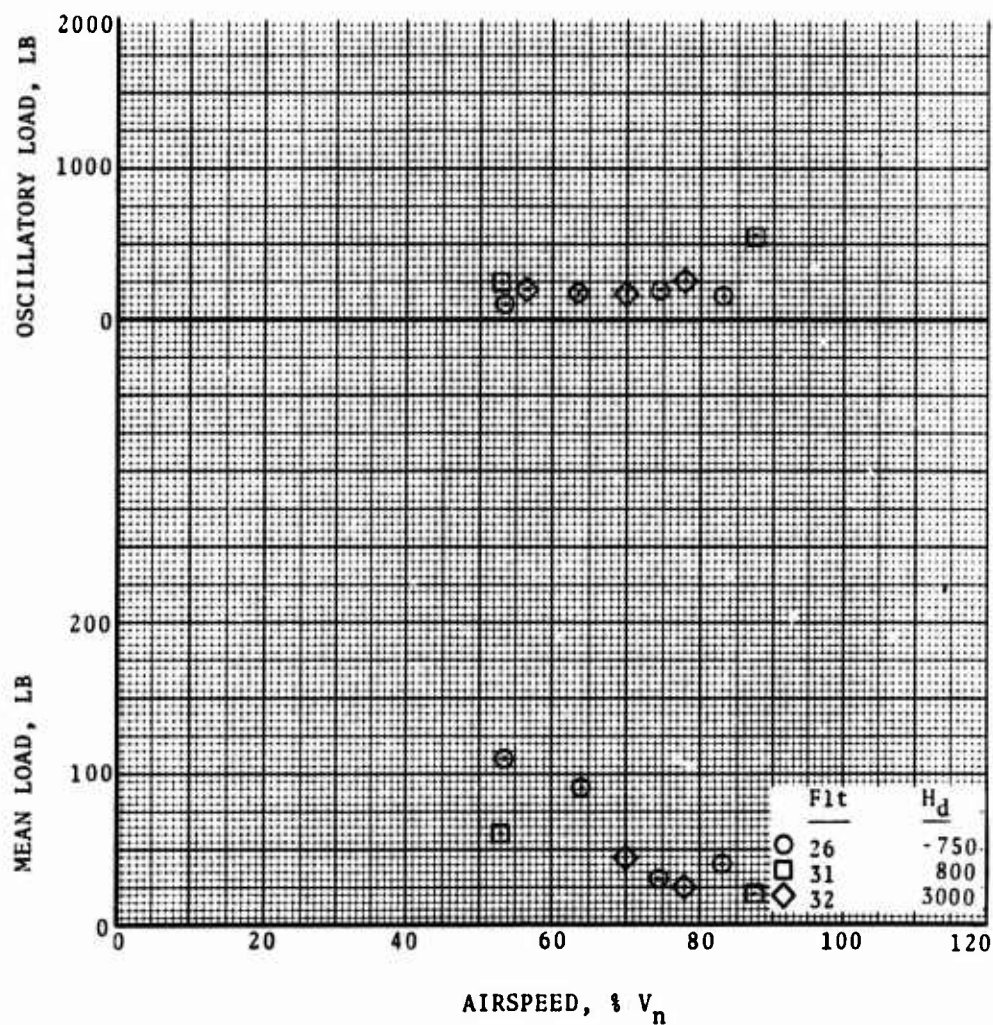
a) Flights 26, 31 and 32, 8500-lb Gross Weight

Figure C-9. Lateral Boost Tube Load vs Airspeed for FWD C.G. and Various Density Altitudes by Flight and Gross Weight.



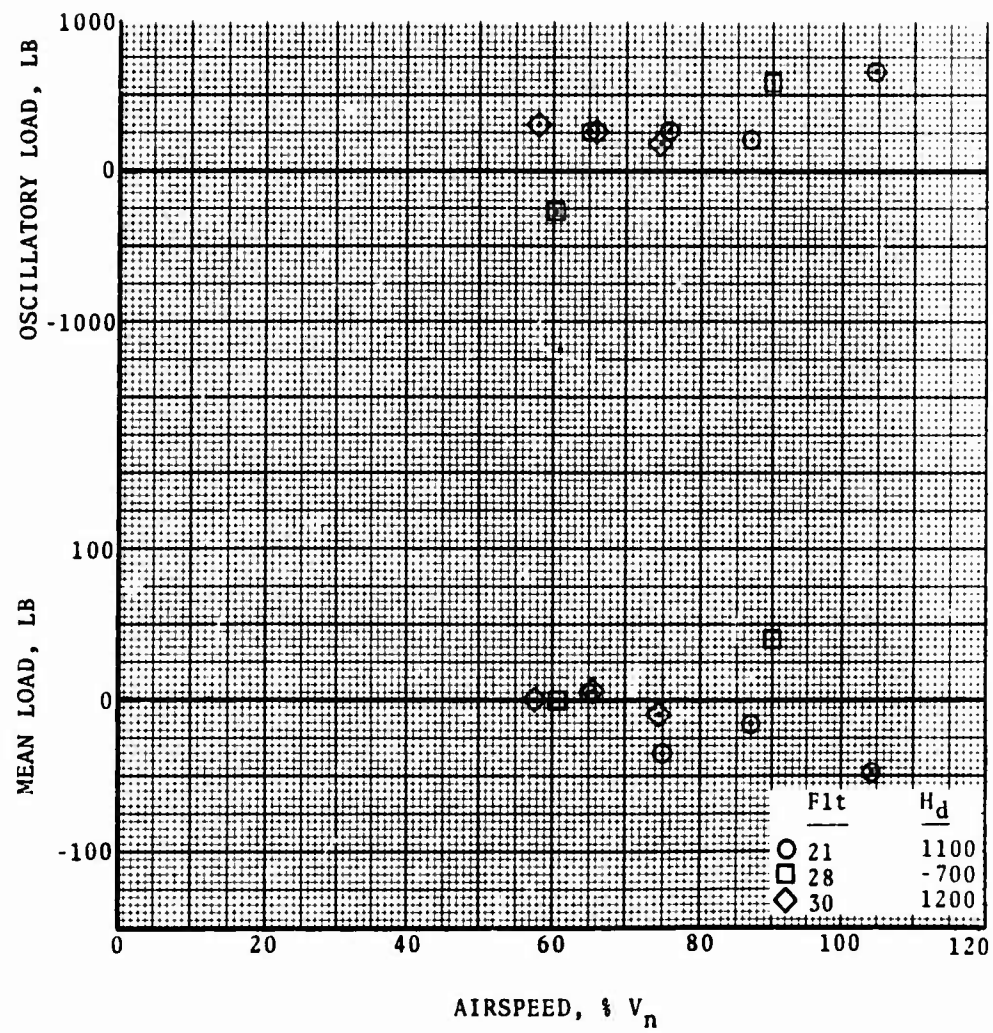
b) Flights 21, 28 and 30, 9500-lb Gross Weight

Figure C-9. (Concl'd)



a) Flights 26, 31 and 32, 8500-lb Gross Weight

Figure C-10. Collective Boost Tube Load vs Airspeed for FWD C.G. and Various Density Altitudes by Flight and Gross Weight.



b) Flights 21, 28 and 30, 9500-lb Gross Weight

Figure C-10. (Concl'd)

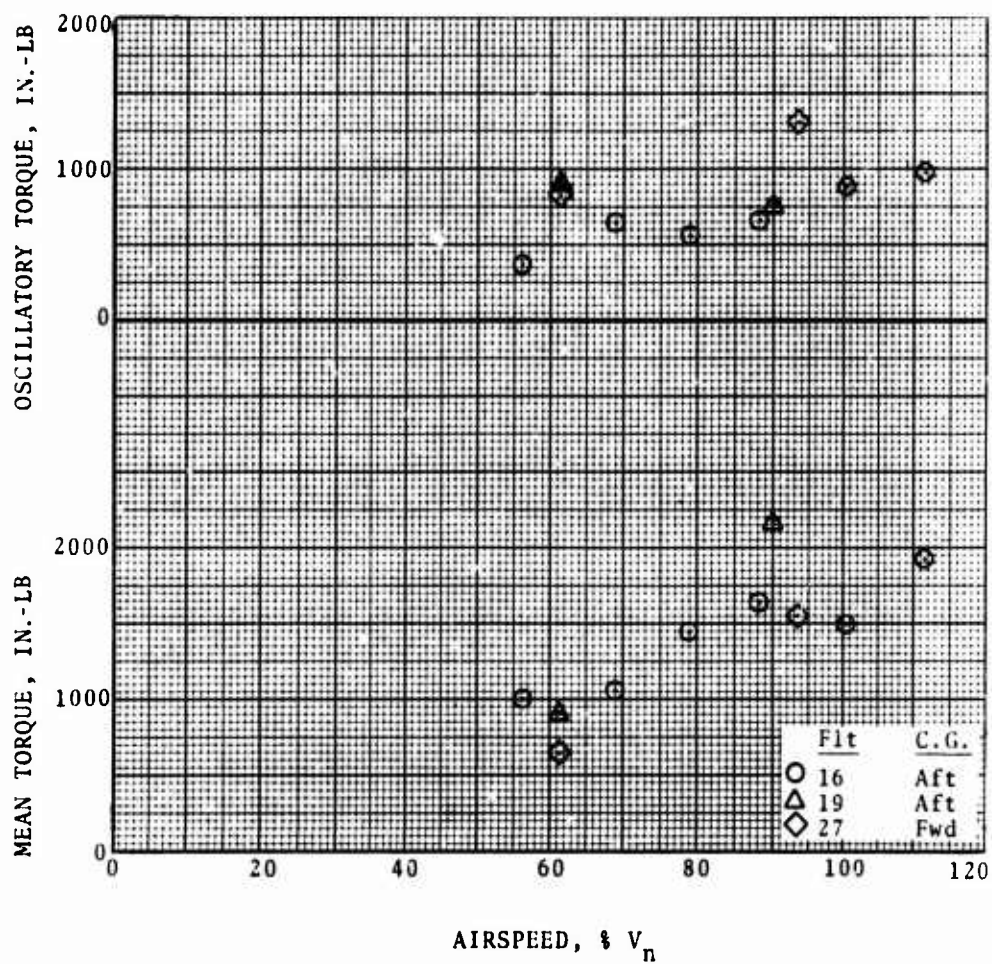


Figure C-11. Tail Rotor Shaft Torque vs Airspeed for AFT and FWD C.G., 8500-lb Gross Weight and -2000-ft Density Altitude.



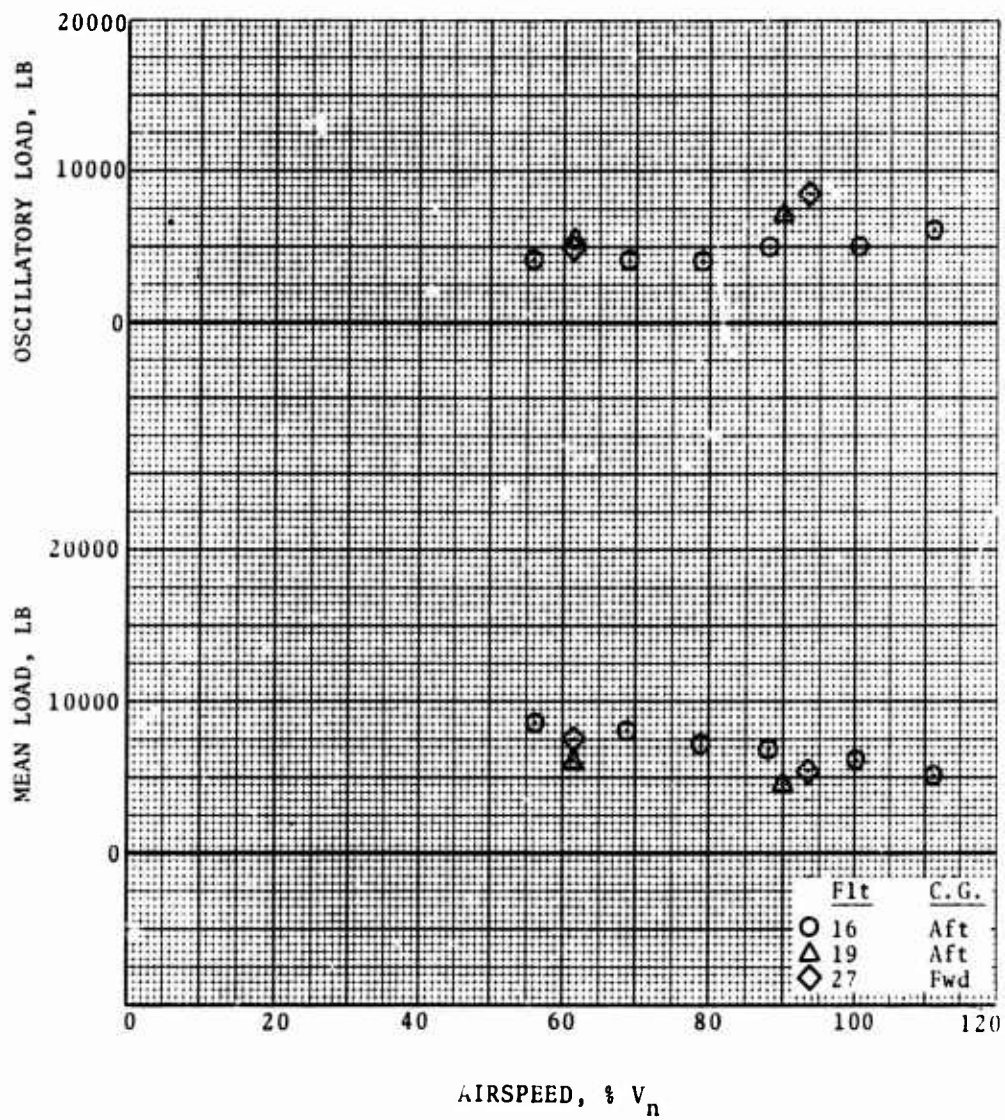


Figure C-12. Drag Brace Load vs Airspeed for AFT and FWD C.G., 8500-lb Gross Weight and -2000-ft Density Altitude.

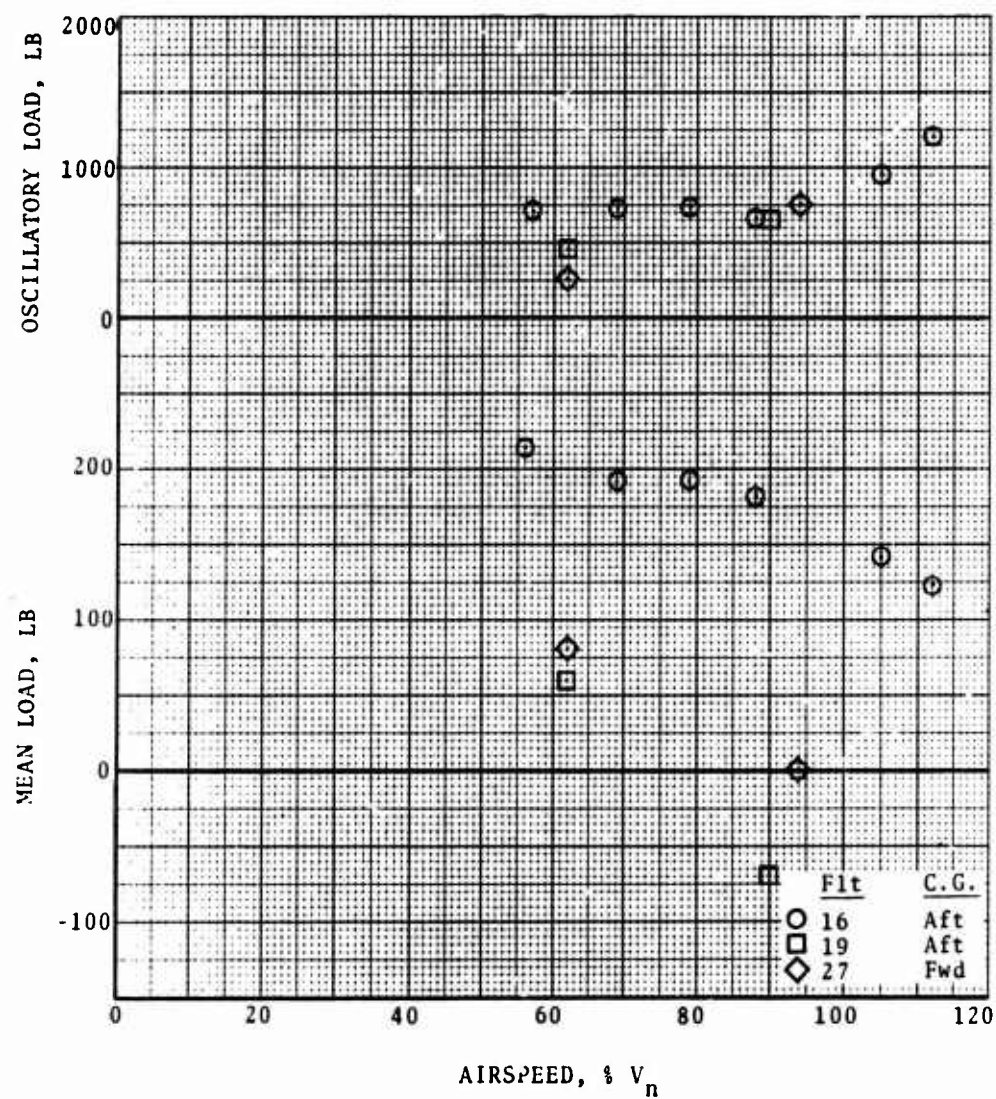


Figure C-i3. Scissors Tube Load vs Airspeed for AFT and FWD C.G., 8500-lb Gross Weight and -2000-ft Density Altitude.

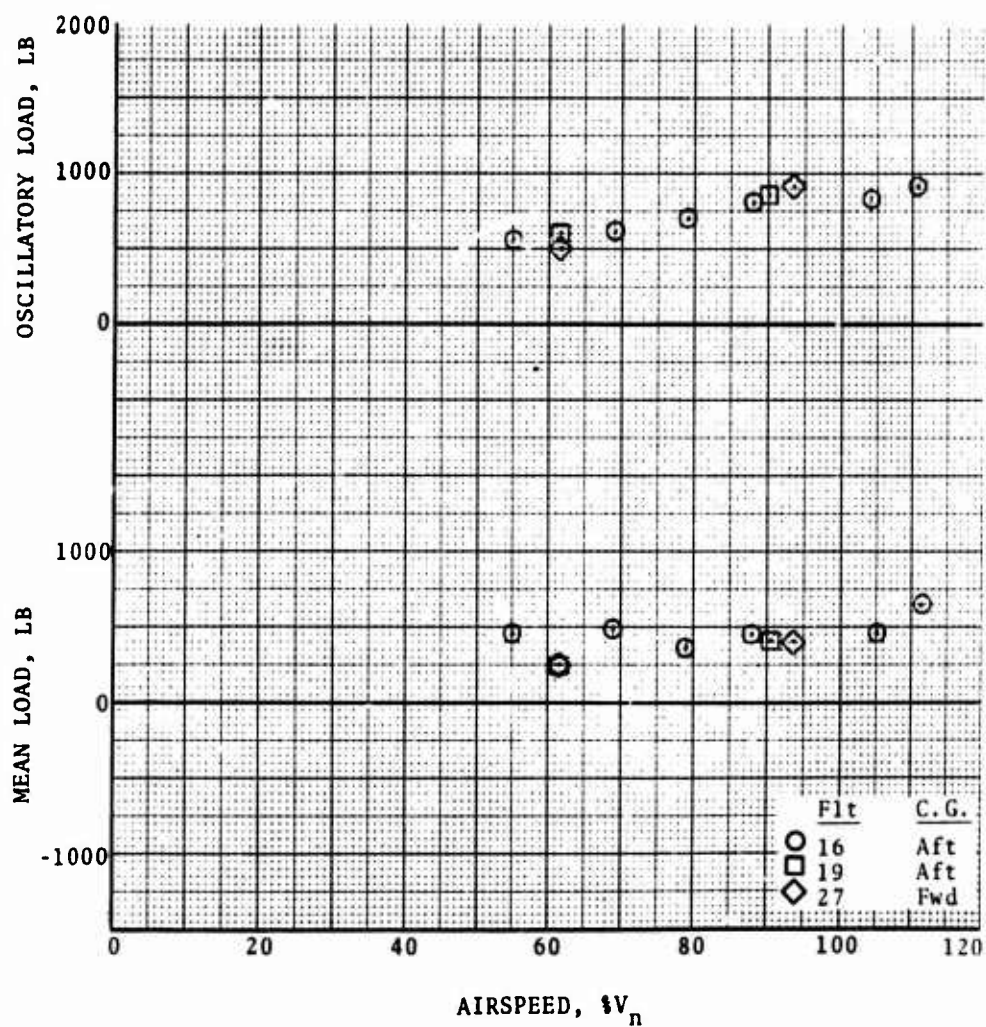


Figure C-14. Longitudinal Boost Tube Load vs Airspeed for AFT and FWD C.G., 8500-lb Gross Weight and -2000-ft Density Altitude.



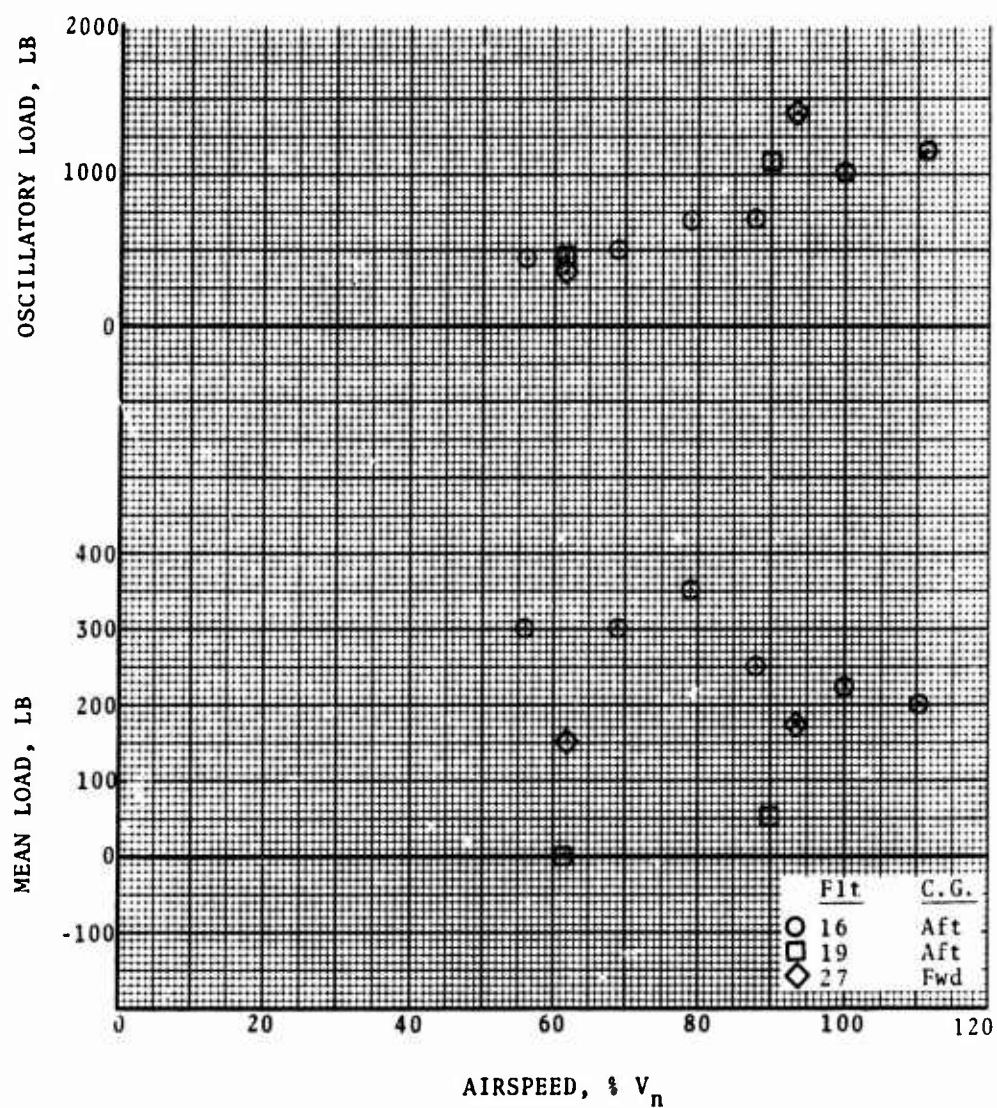


Figure C-15. Lateral Boost Tube Load vs Airspeed for AFT and FWD C.G., 8500-lb Gross Weight and -2000-ft Density Altitude.

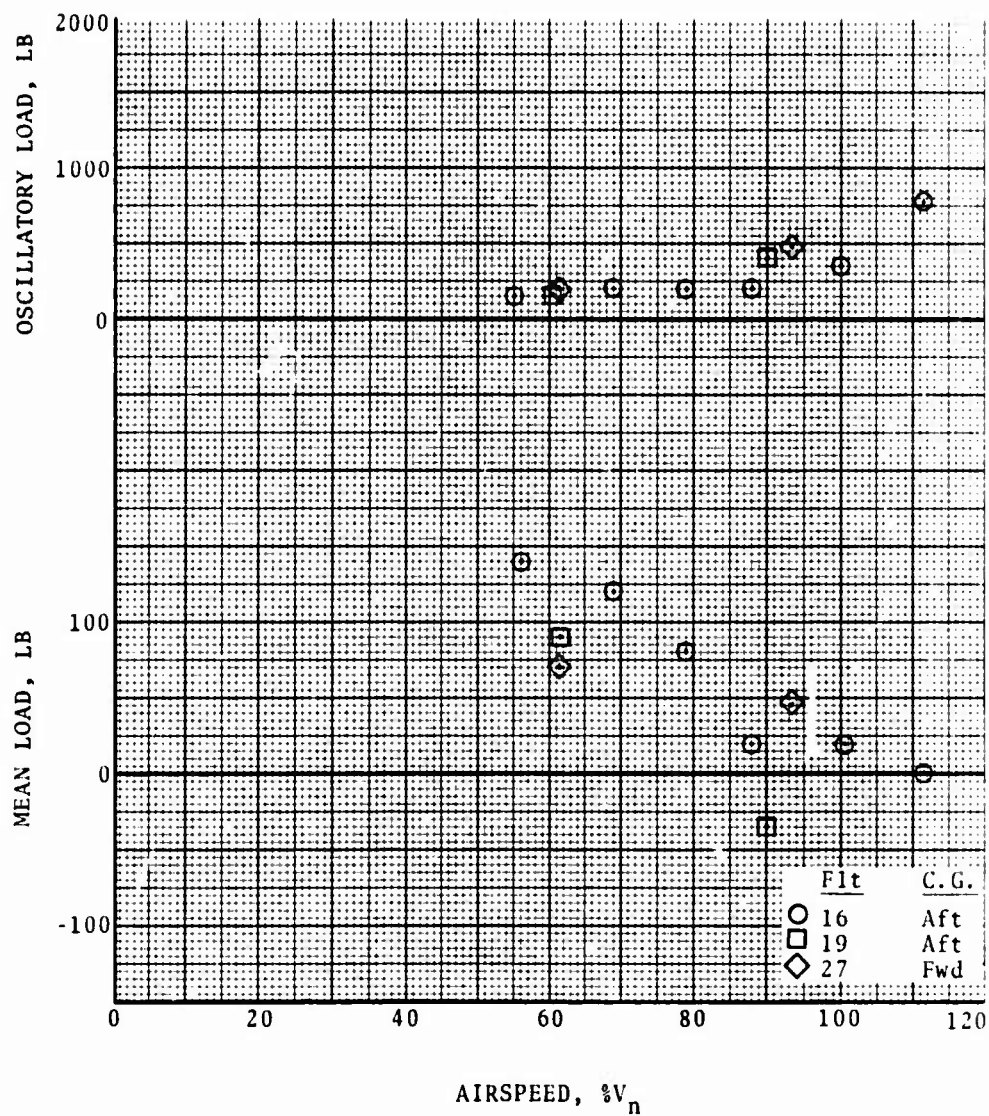
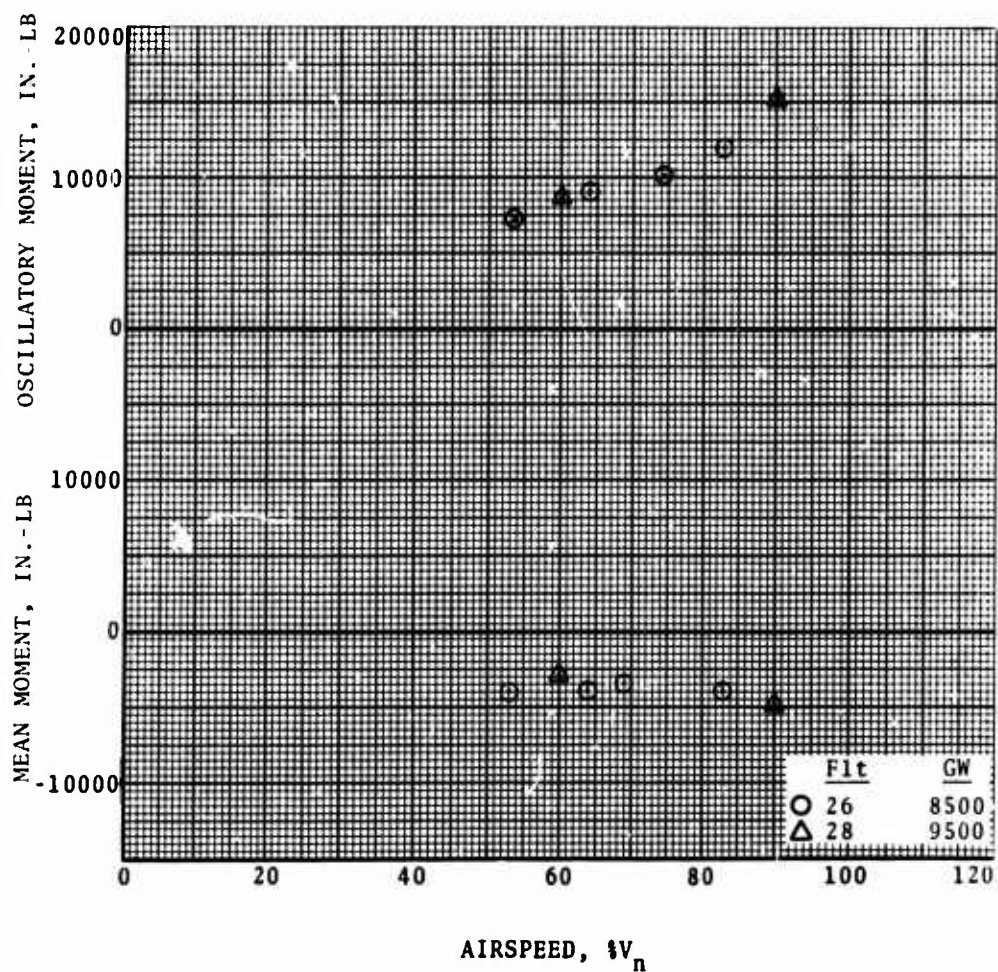
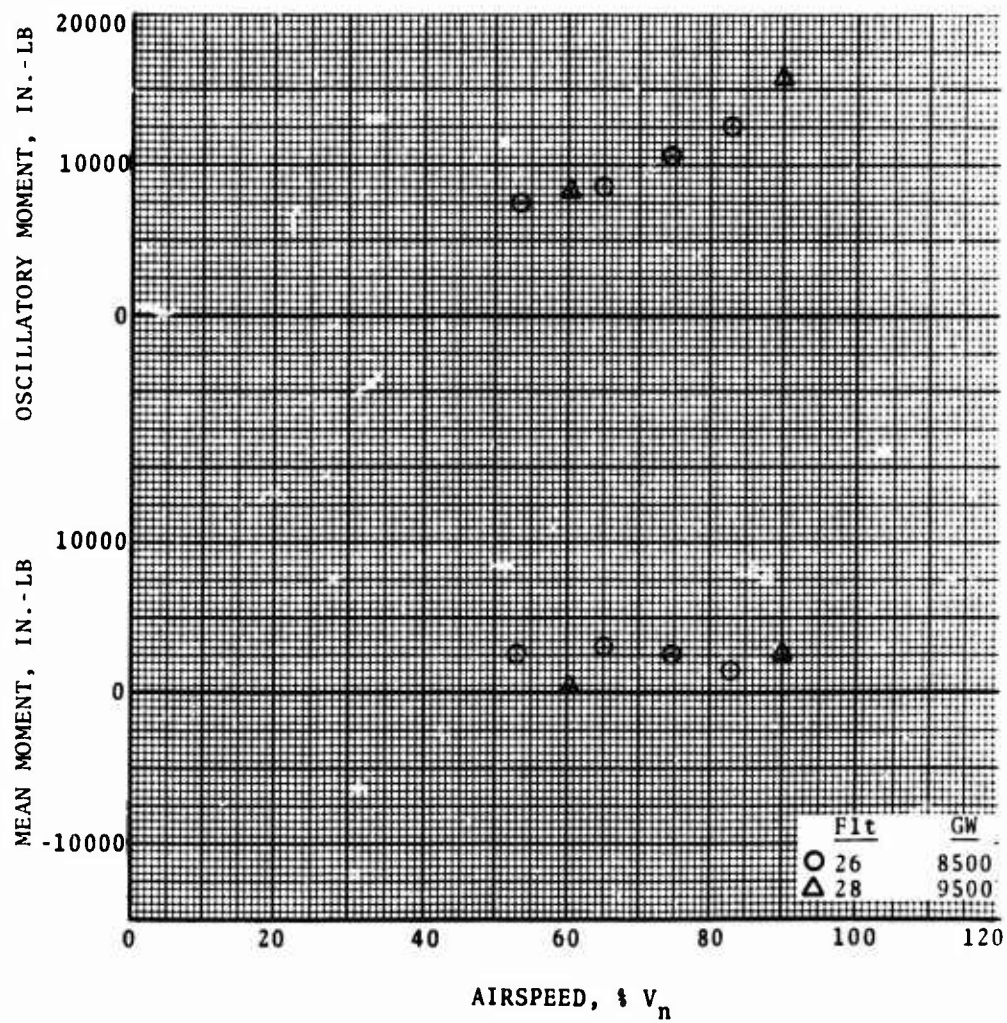


Figure C-16. Collective Boost Tube Load vs Airspeed for AFT and FWD C.G., 8500-lb Gross Weight and -2000-ft Density Altitude.



a) Station 192

Figure C-17. Main Rotor Blade Beamwise Bending vs Airspeed for 8500- and 9500-lb Gross Weight, FWD C.G., and -2500-ft Density Altitude by Station.



b) Station 150

Figure C-17. (Concl'd)

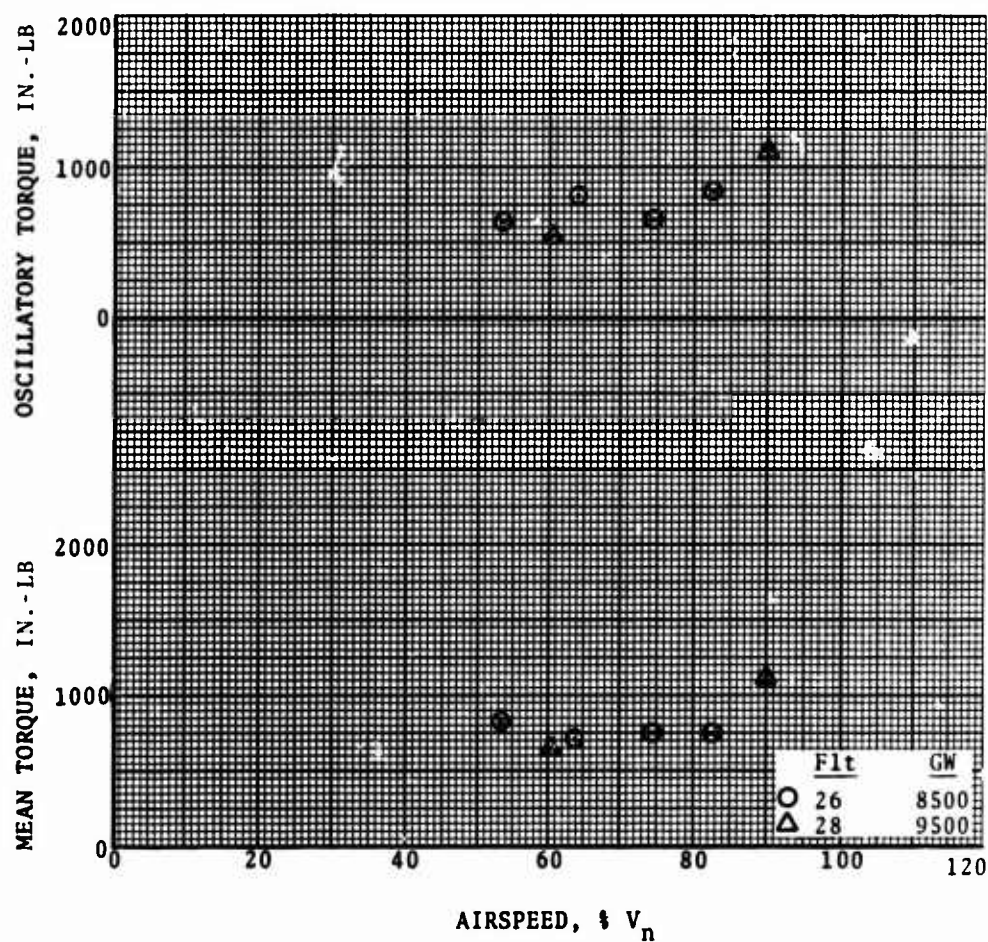


Figure C-18. Tail Rotor Shaft Torque vs Airspeed for 8500- and 9500-lb Gross Weight, Forward C.G. Position and -2500-ft Density Altitude.

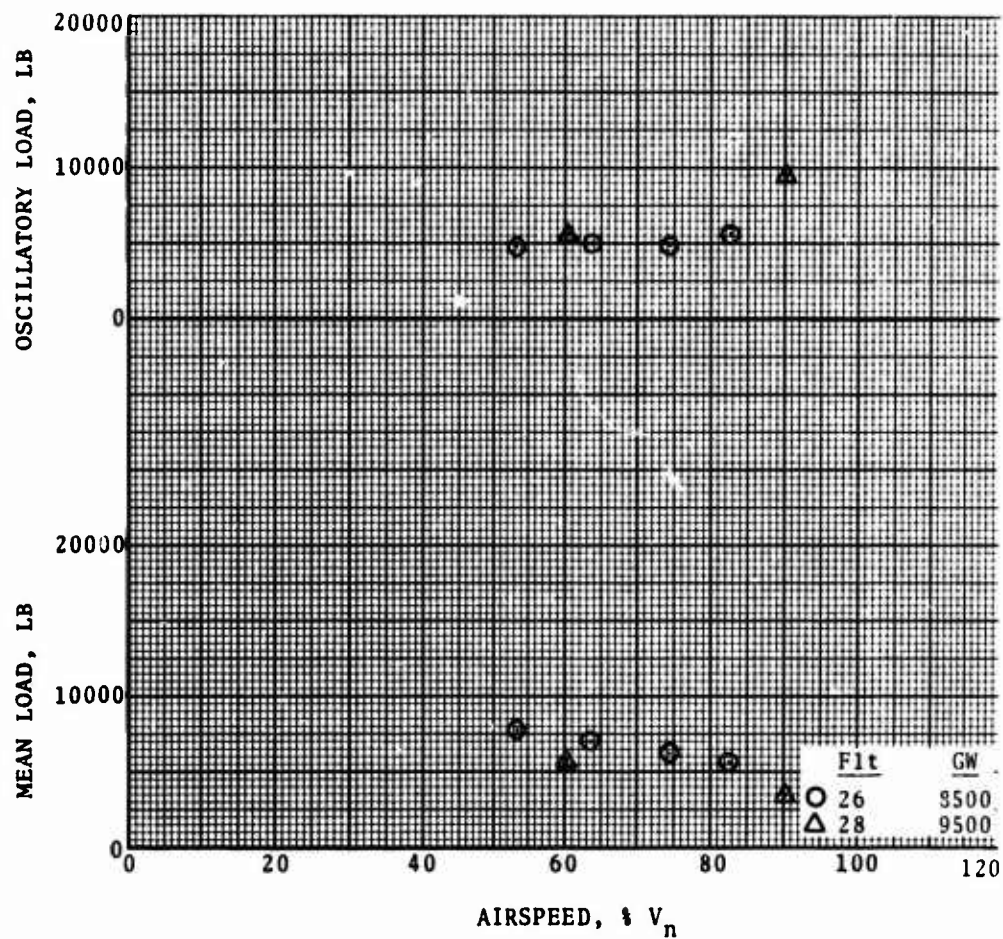


Figure C-19. Drag Brace Load vs Airspeed for 8500- and 9500-lb Gross Weight, Forward C.G. Position and -2500-ft Density Altitude.



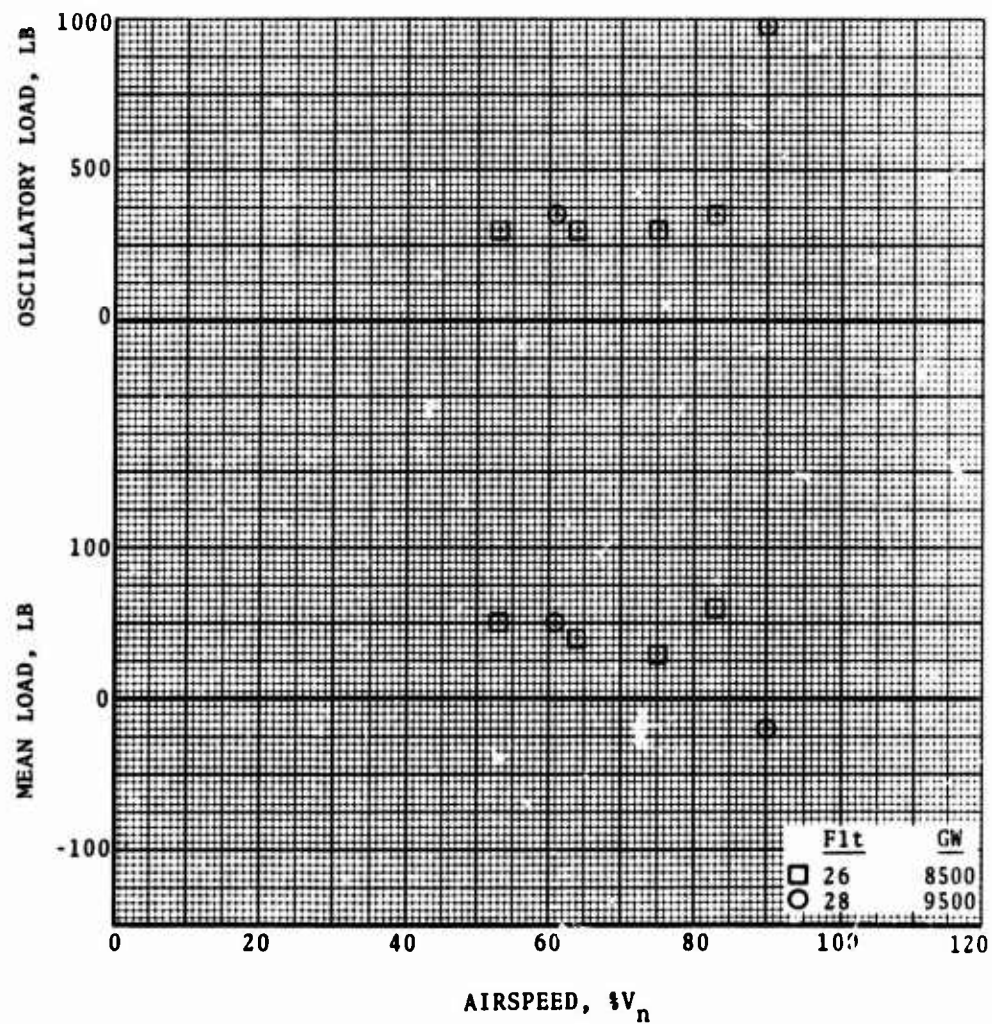


Figure C-20. Scissors Tube Load vs Airspeed for 8500- and 9500-lb Gross Weight, Forward C.G. Position and -2500-ft Density Altitude.

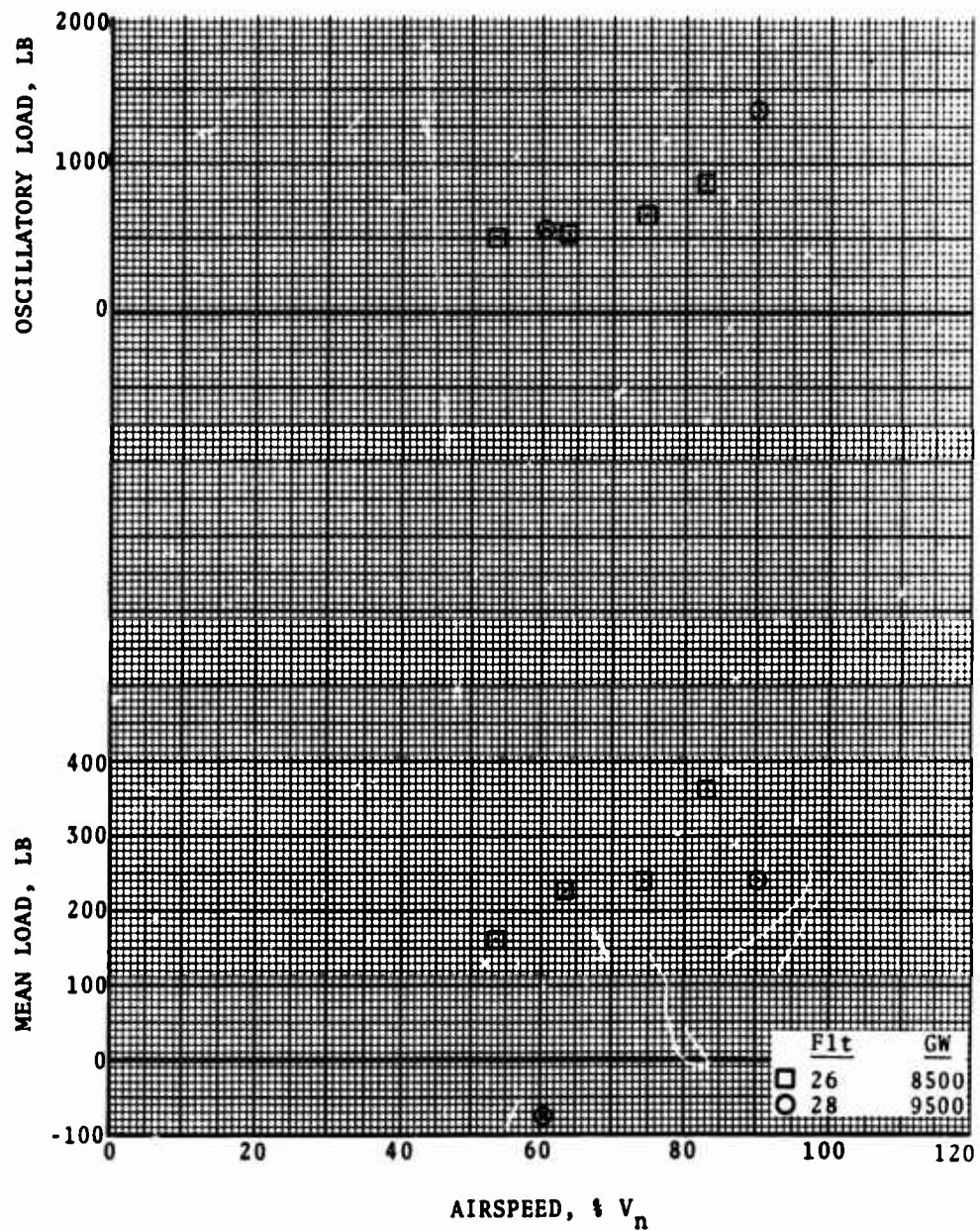


Figure C-21. Longitudinal Boost Tube Load vs Airspeed for 8500- and 9500-lb Gross Weight, Forward C.G. Position and -2500-ft Density Altitude.



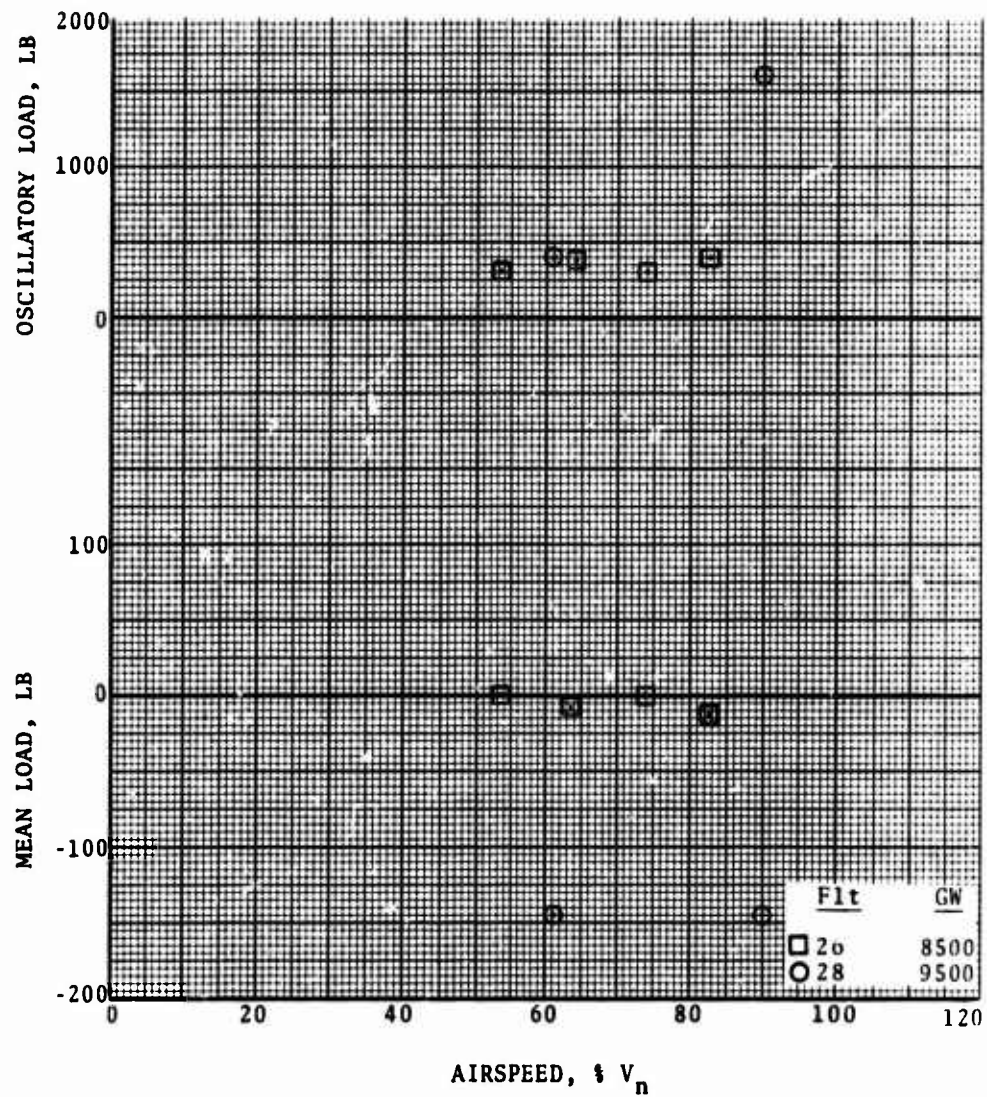


Figure C-22. Lateral Boost Tube Load vs Airspeed for 8500- and 9500-lb Gross Weight, Forward C.G. Position and -2500-ft Density Altitude.

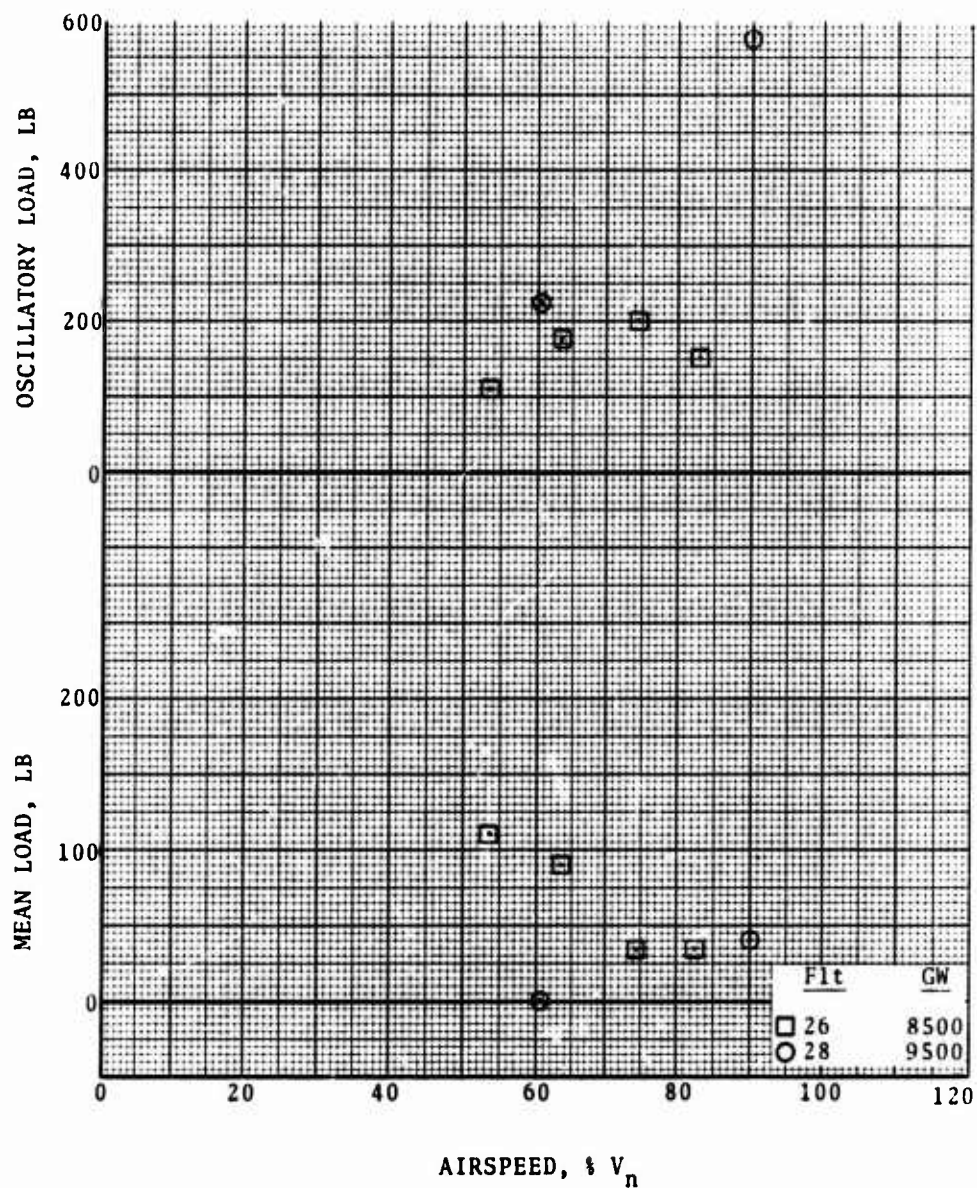
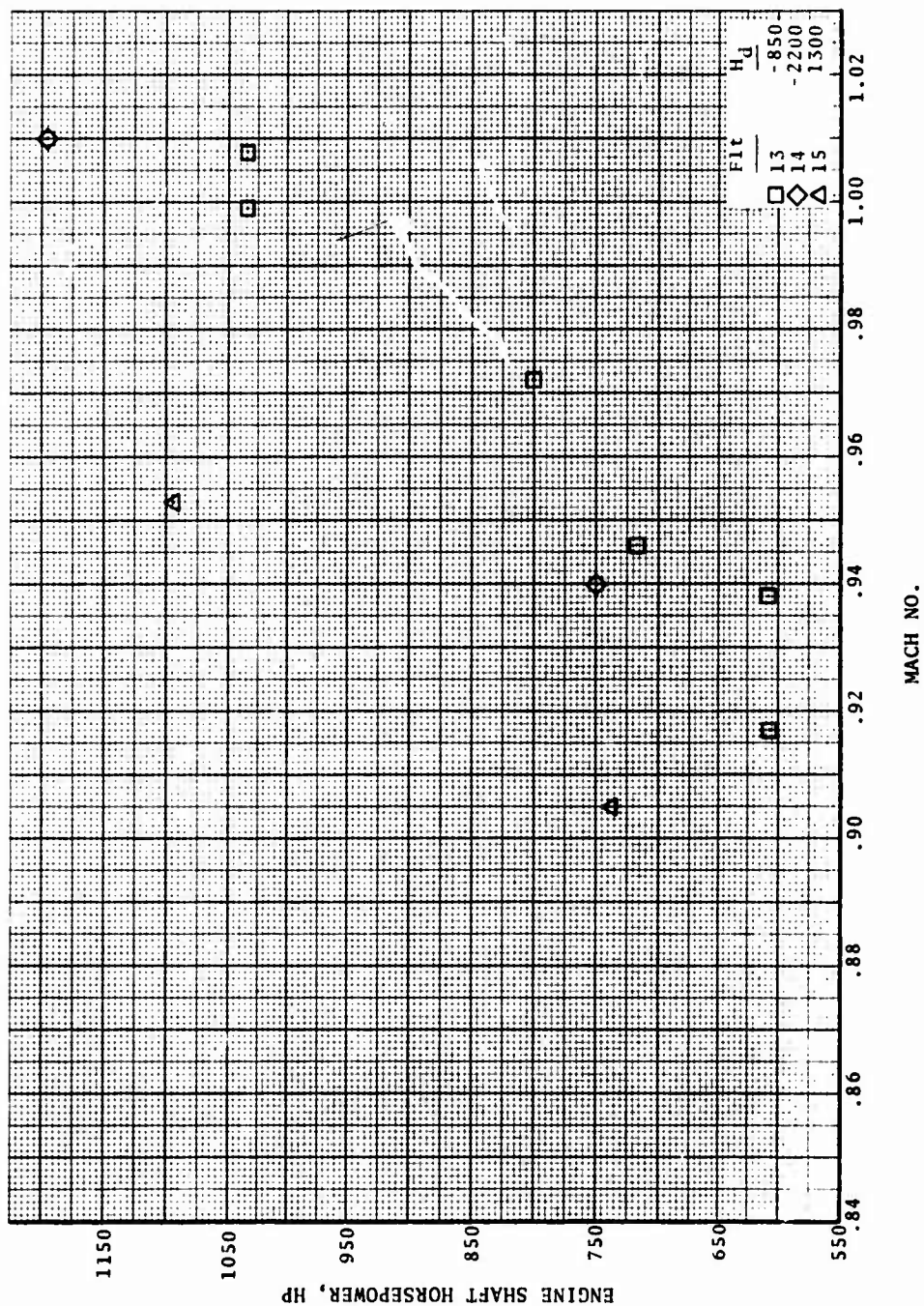
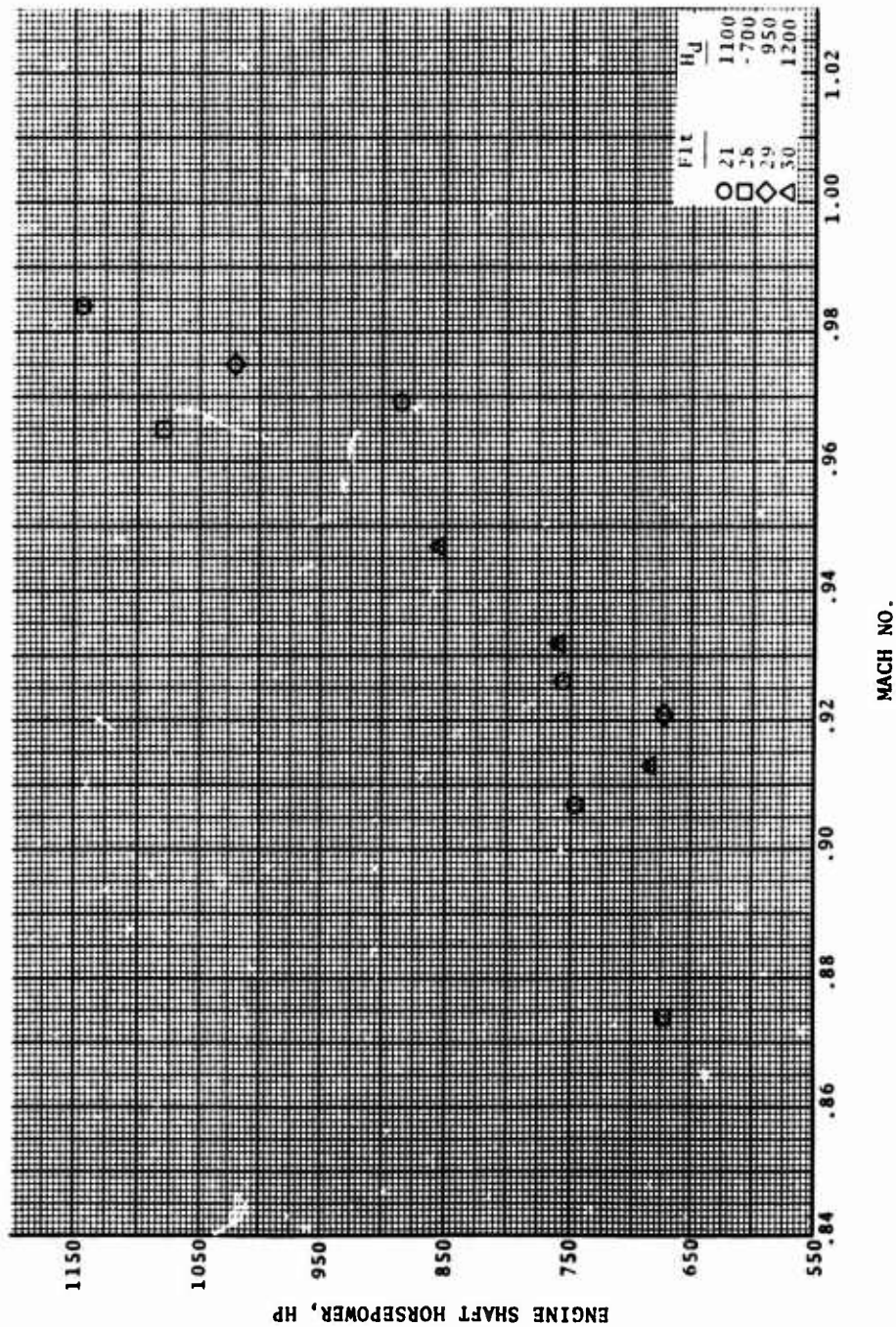


Figure C-23. Collective Boost Tube Load vs Airspeed for 8500- and 9500-lb Gross Weight, Forward C.G. Position and -2500-ft Density Altitude.



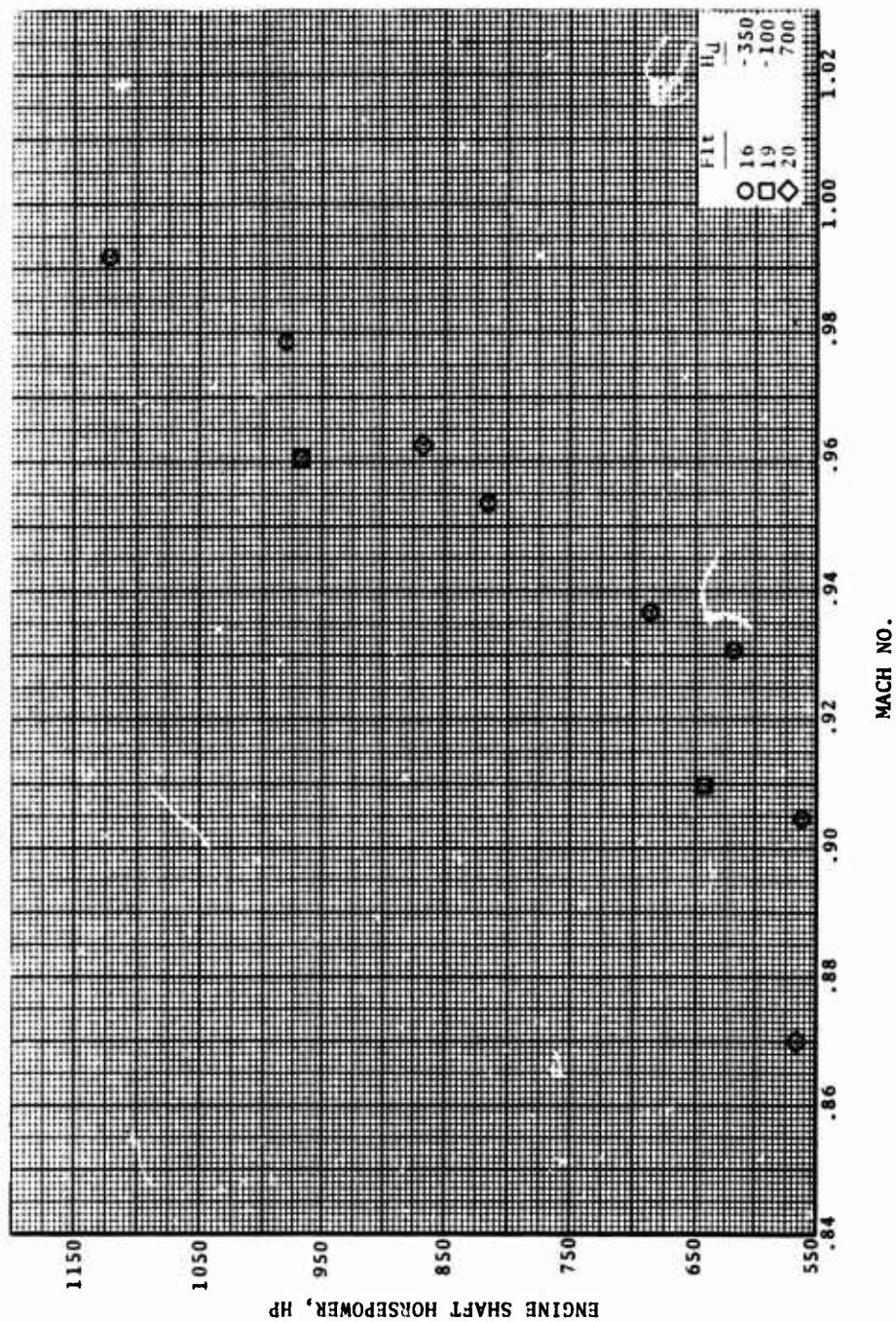
a) 9500-lb Gross Weight and AFT C.G.

Figure C-24. Shaft Horsepower vs Mach Number for Various Density Altitudes by Gross Weight and C.G. Position.



b) 9500-lb Gross Weight and FWD C.G.

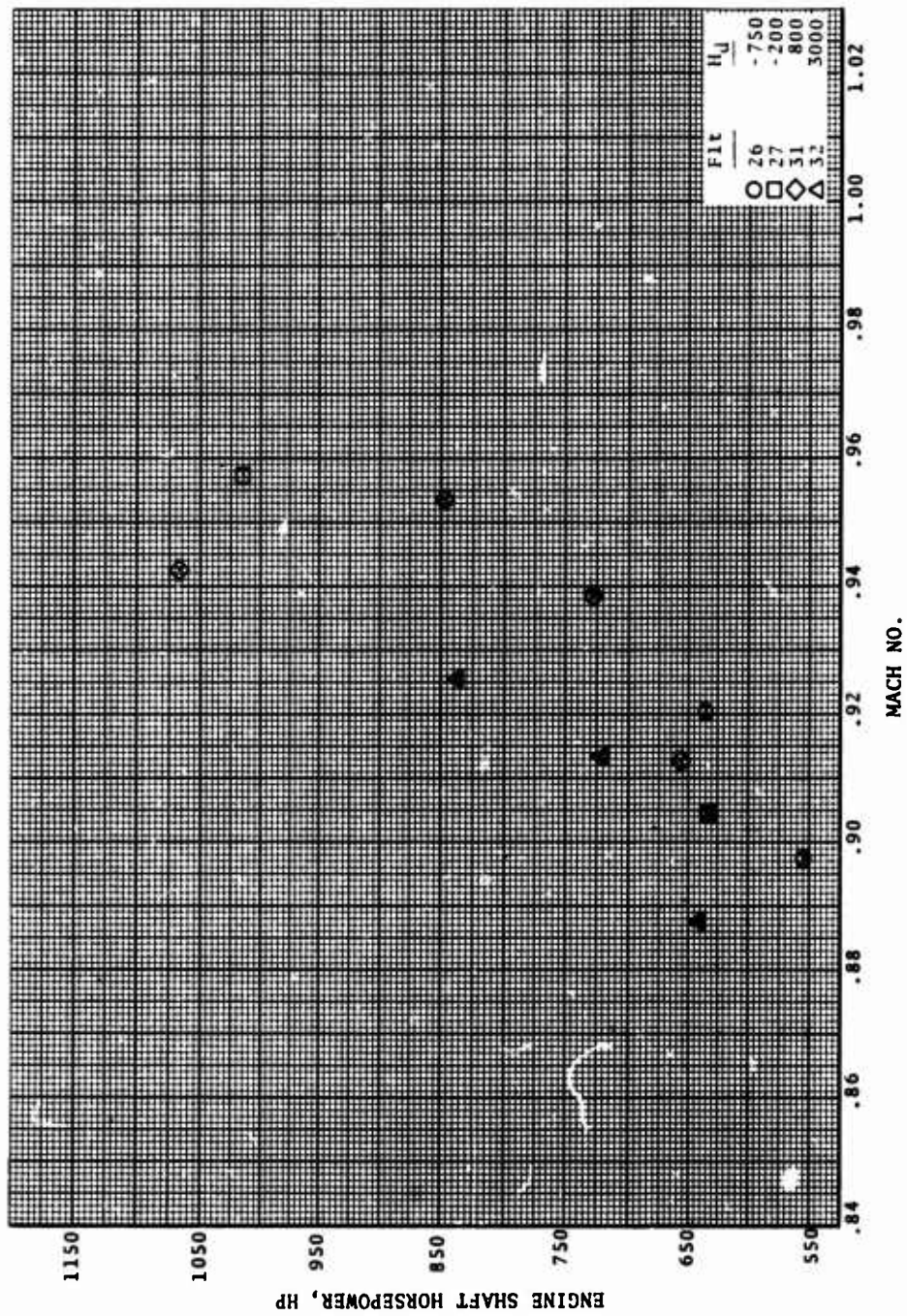
Figure C-24. (Cont'd)



c) 8500-lb Gross Weight and AFT C.G.

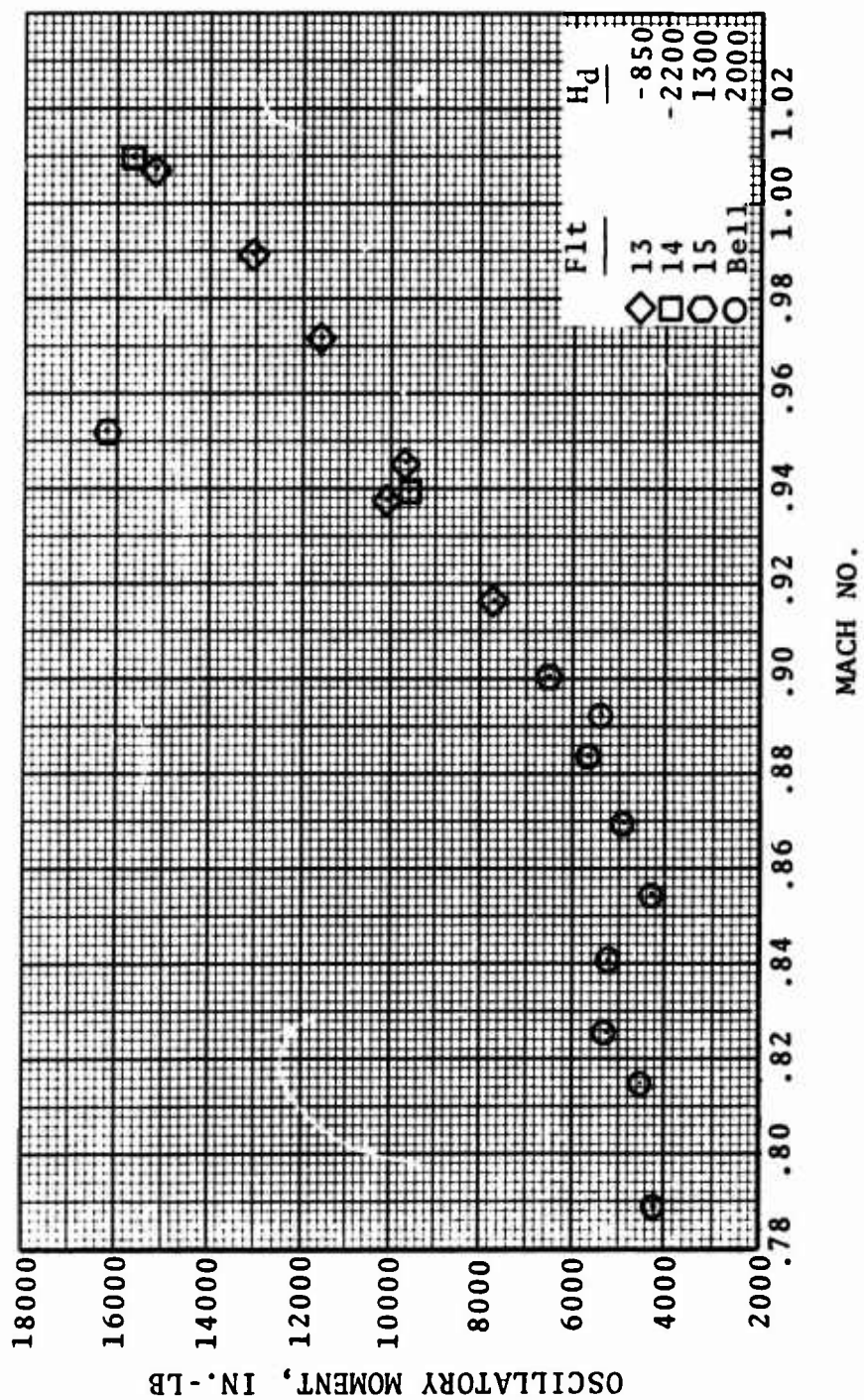
Figure C-24. (Cont'd)





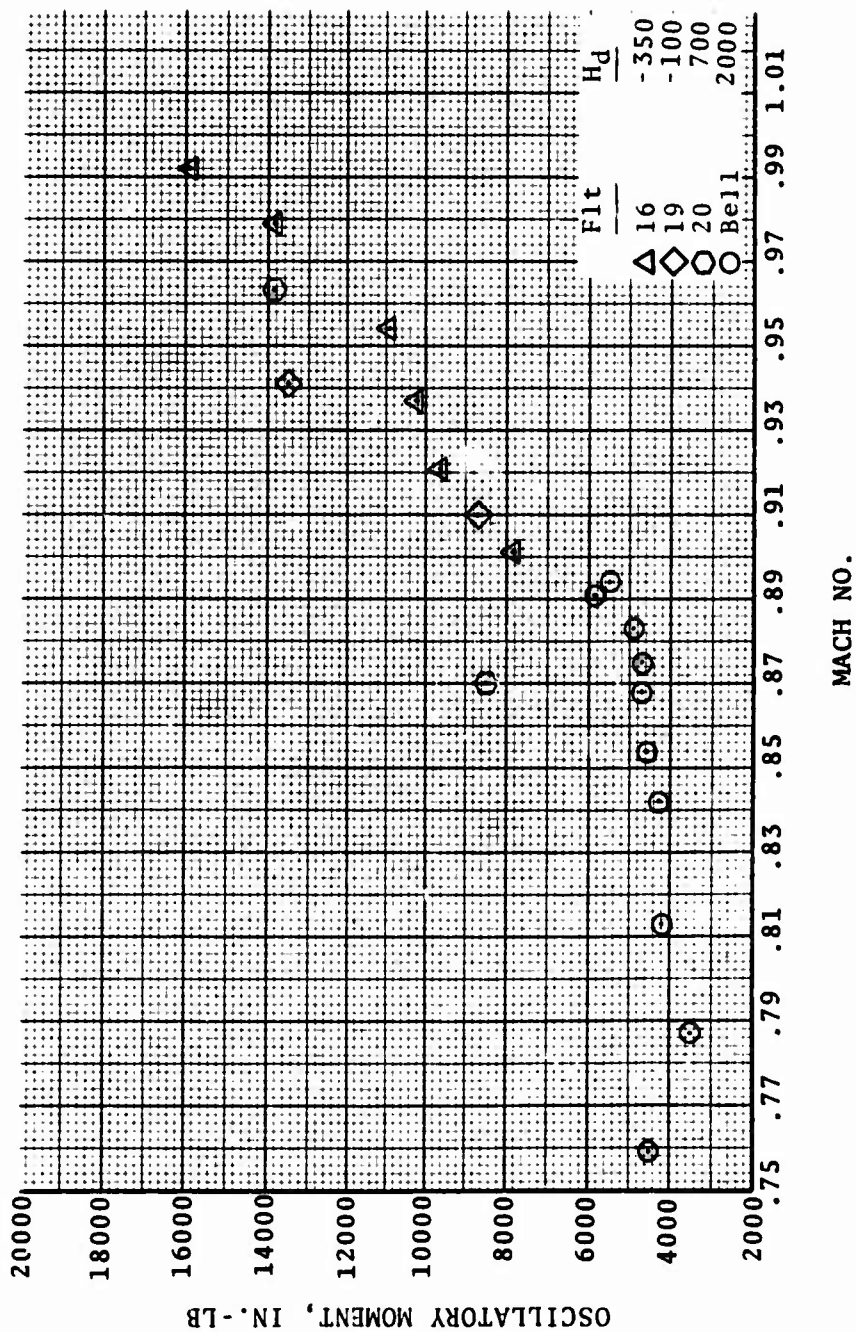
d) 8500-lb Gross Weight and FWD C.G.

Figure C-24. (Concl'd)



a) Station 192, 9500-lb Gross Weight

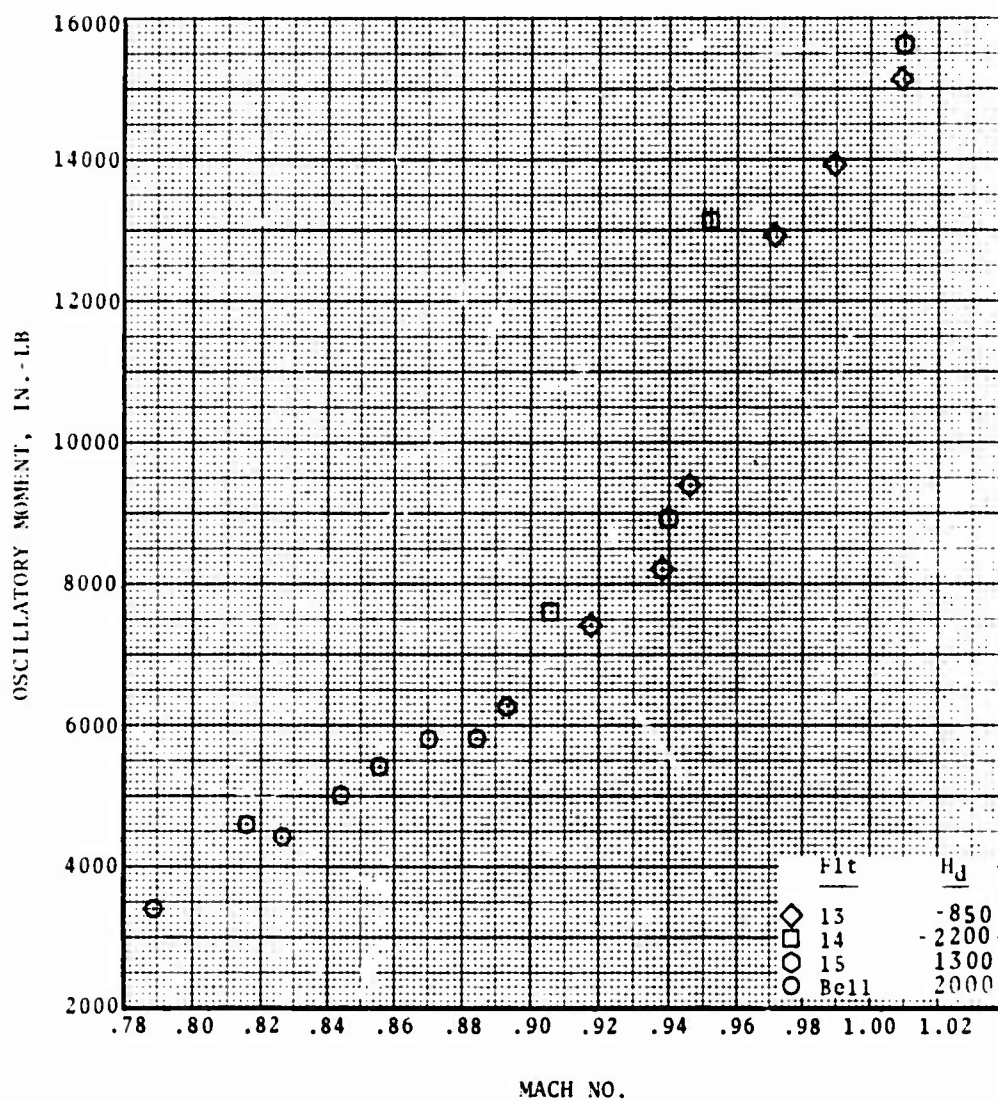
Figure C-25. Main Rotor Blade Beamwise Bending vs Mach Number for AFT C.G. and Various Density Altitudes by Station and Gross Weight.



b) Station 192, 8500-lb Gross Weight

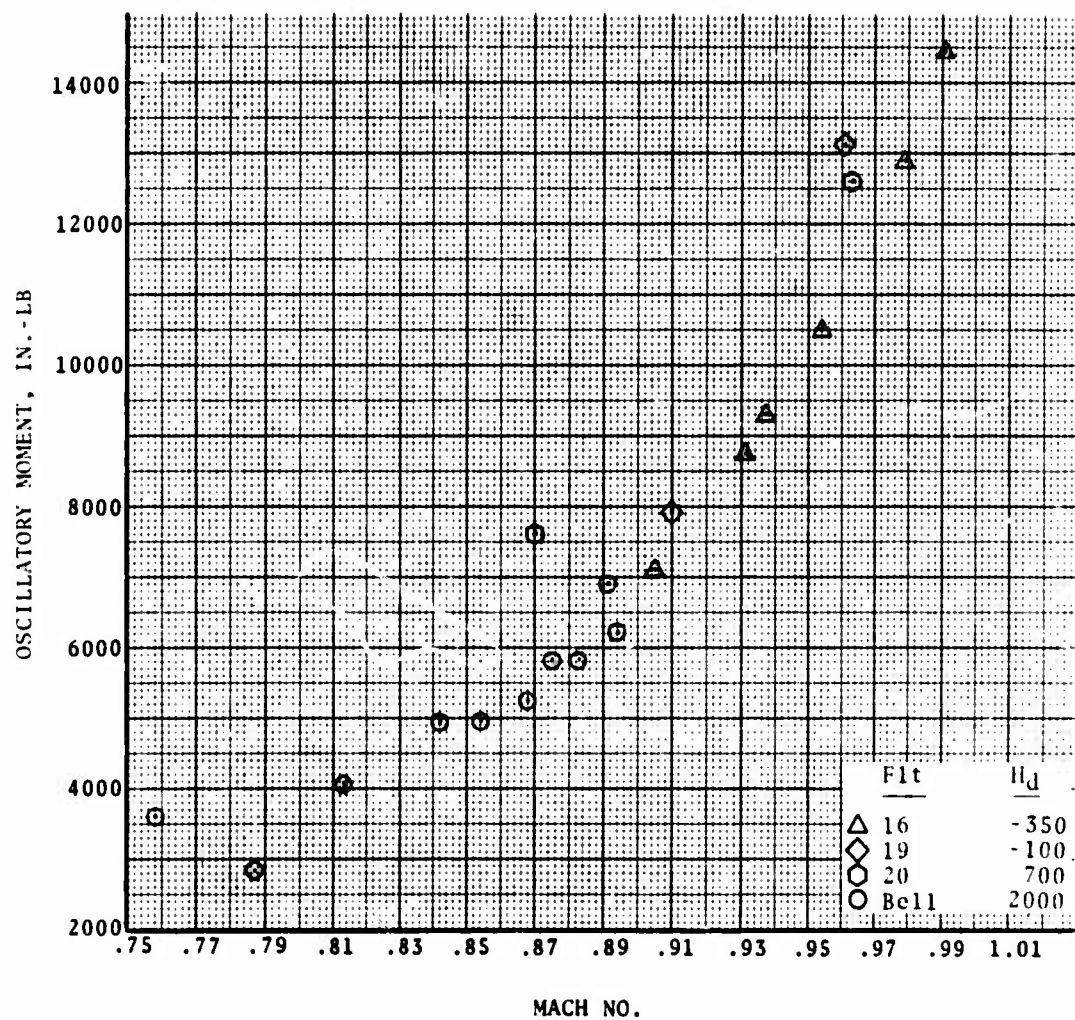
Figure C-25. (Cont'd)





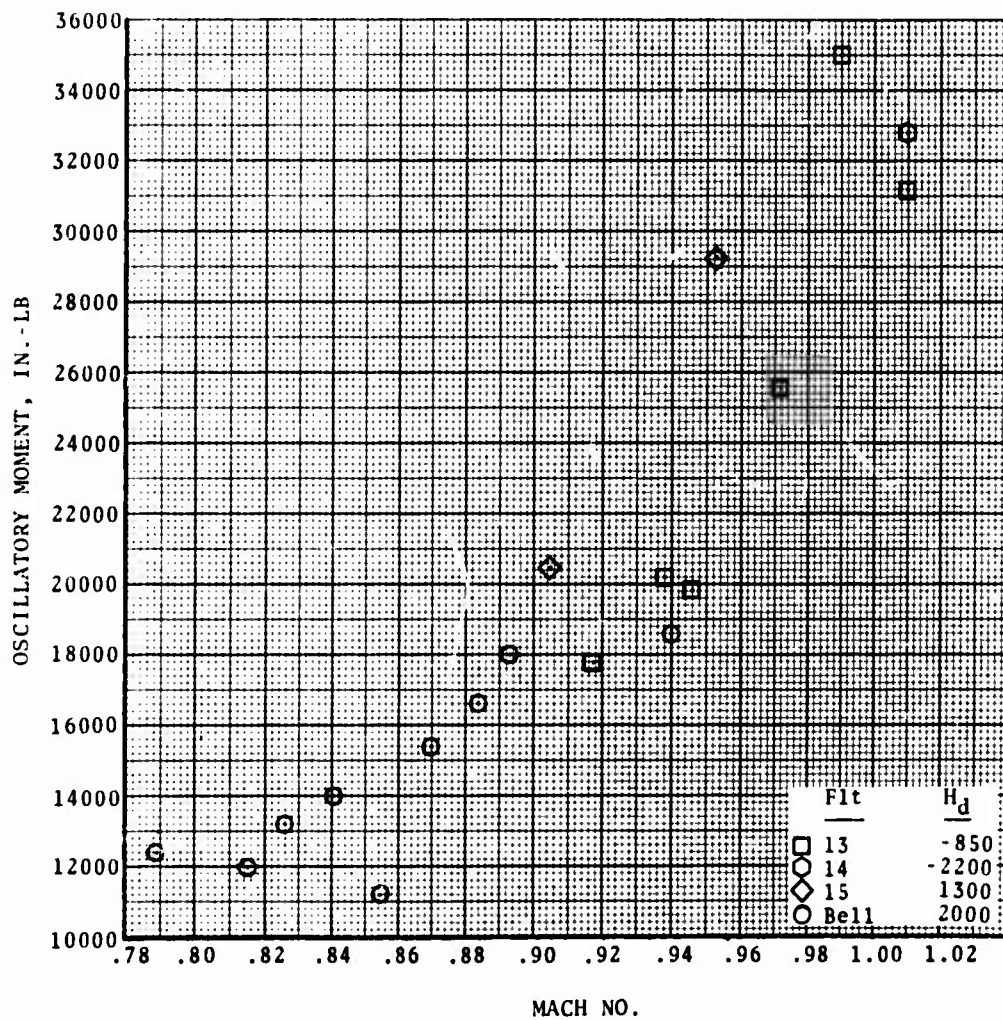
c) Station 150, 9500-lb Gross Weight

Figure C-25. (Cont'd)



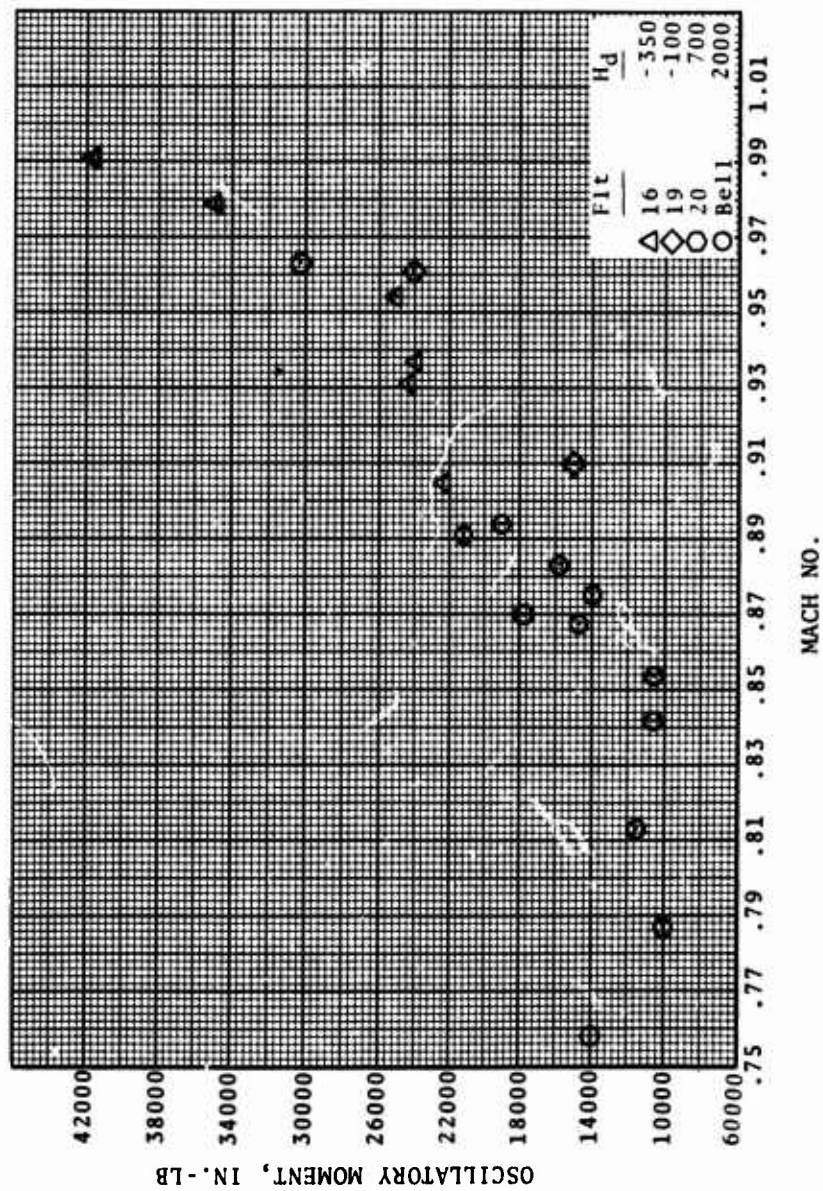
d) Station 150, 8500-lb Gross Weight

Figure C-25. (Cont'd)



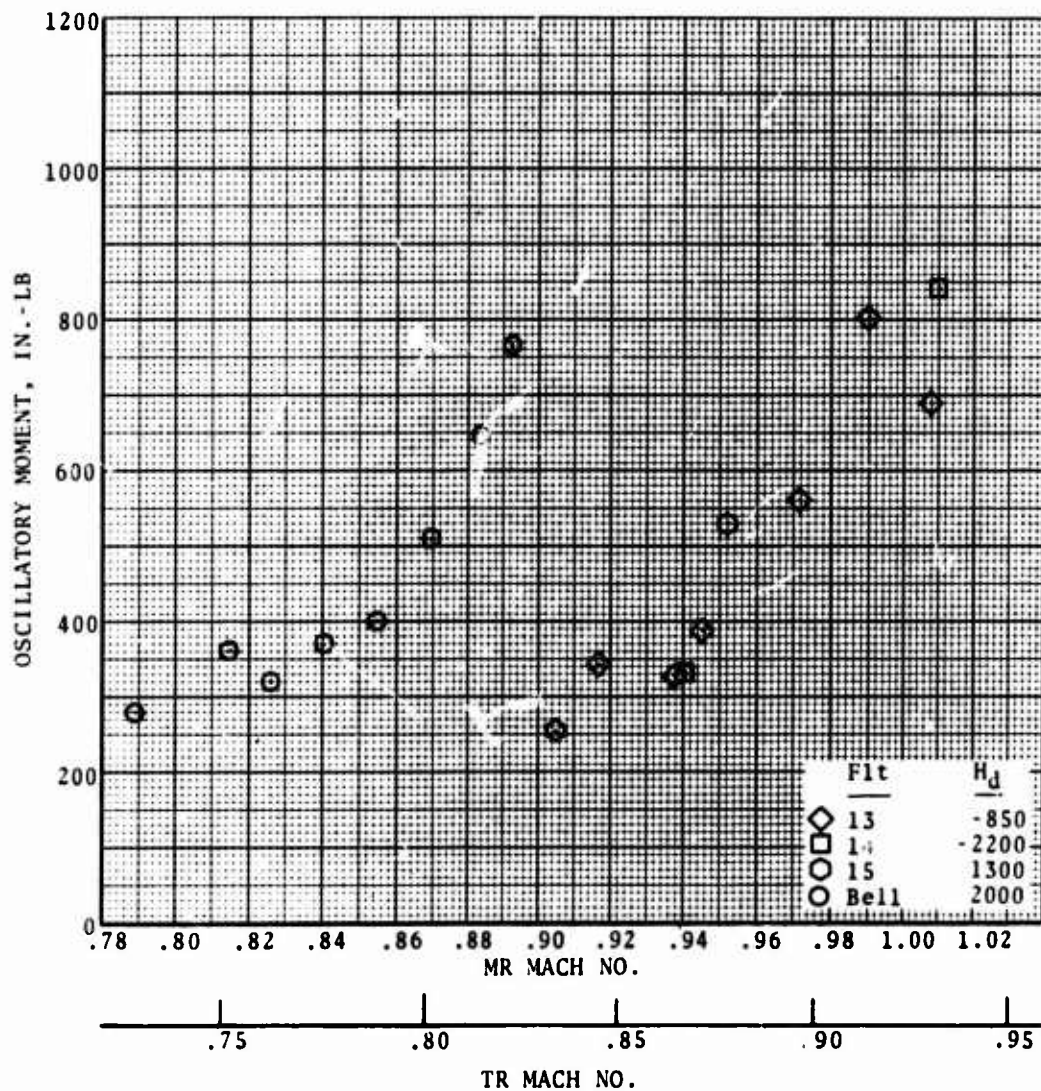
e) Station 35, 9500-lb Gross Weight

Figure C-25. (Cont'd)



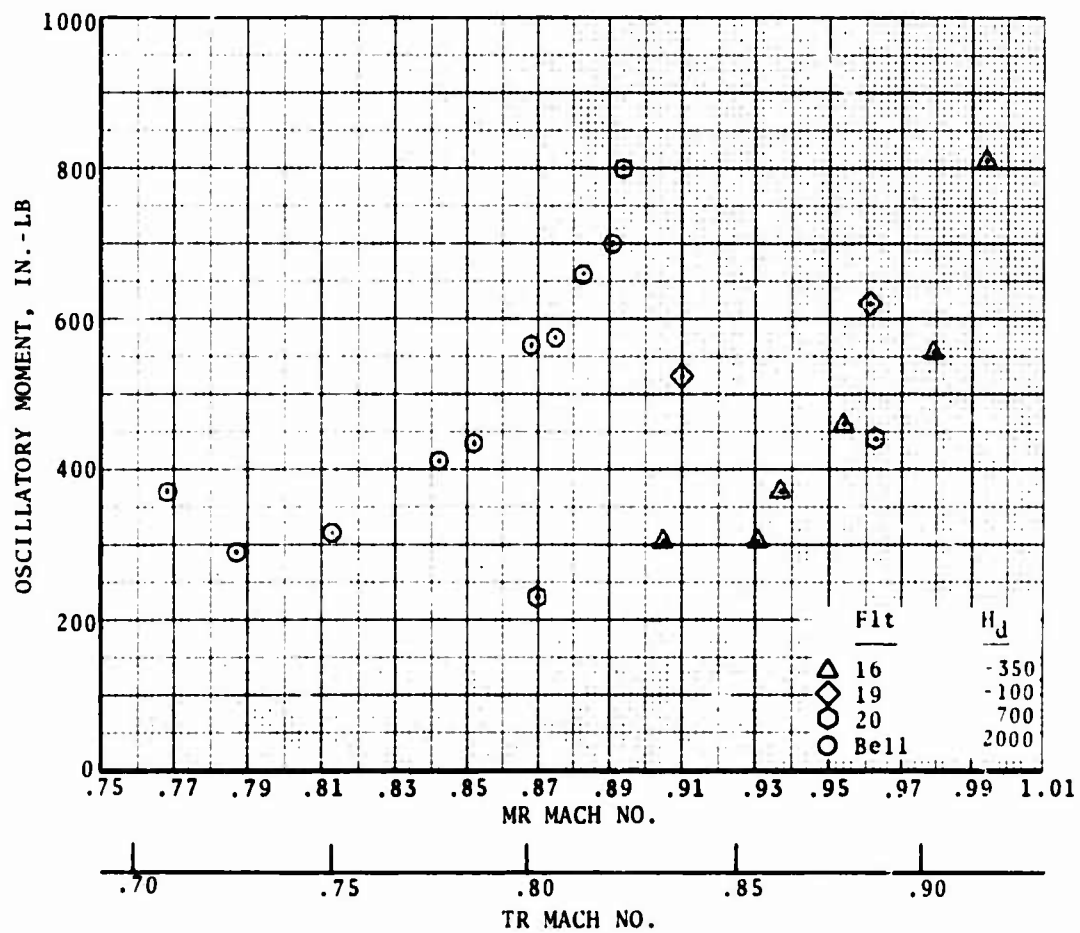
f) Station 35, 8500-lb Gross Weight

Figure C-25. (Concl'd)



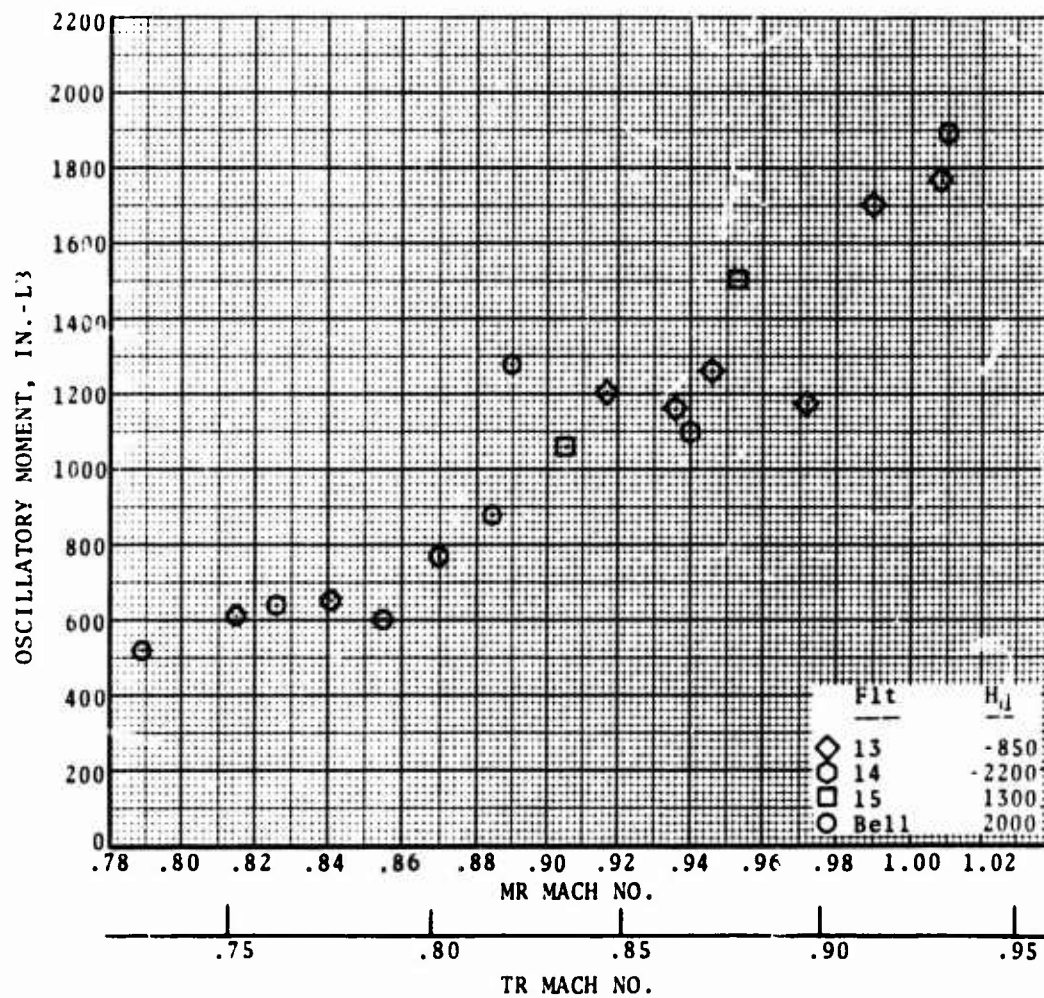
a) Station 21.5, 9500-lb Gross Weight

Figure C-26. Tail Rotor Blade Beamwise Bending vs Mach Number for AFT C.G. and Various Density Altitudes by Station and Gross Weight.



b) Station 21.5, 9500-lb Gross Weight

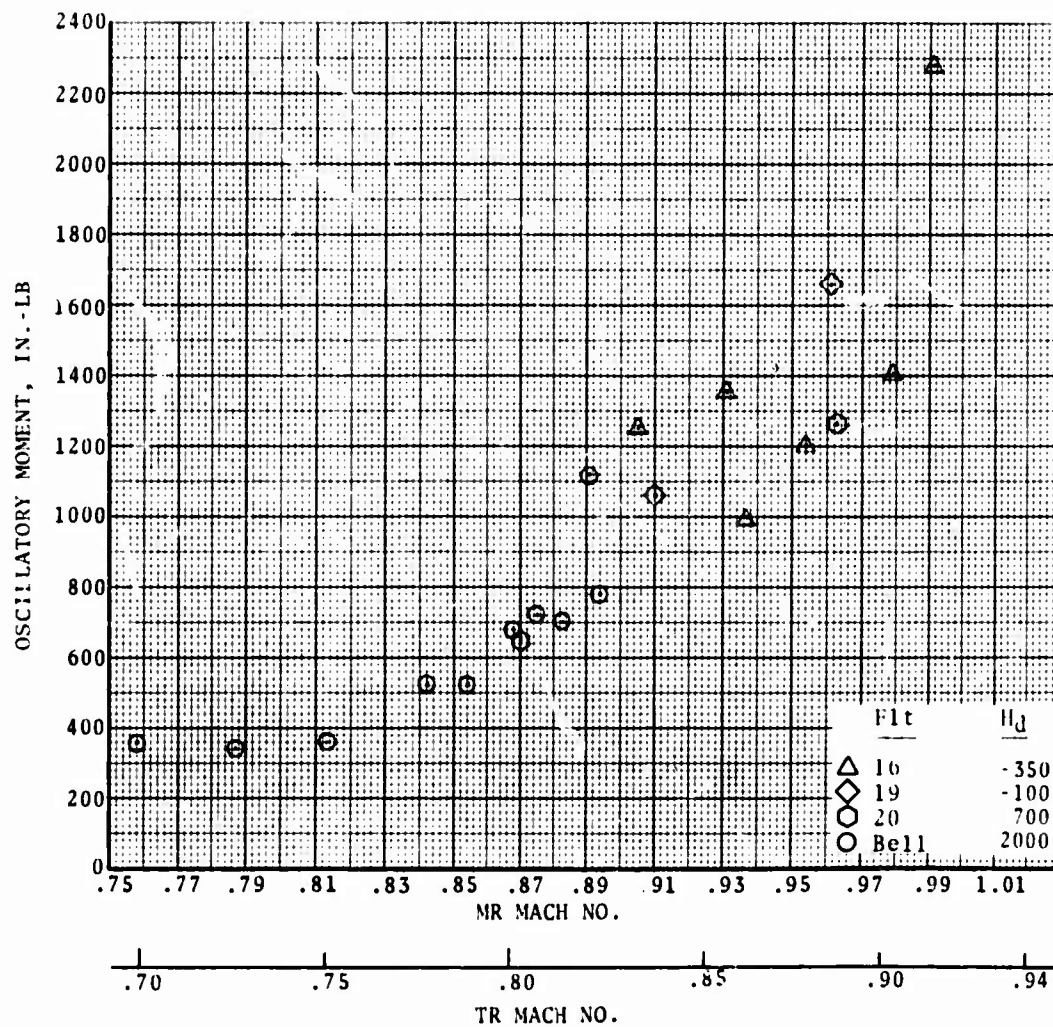
Figure C-26. (Cont'd)



c) Station 11.0, 9500-1b Gross Weight

Figure C-26. (Cont'd)

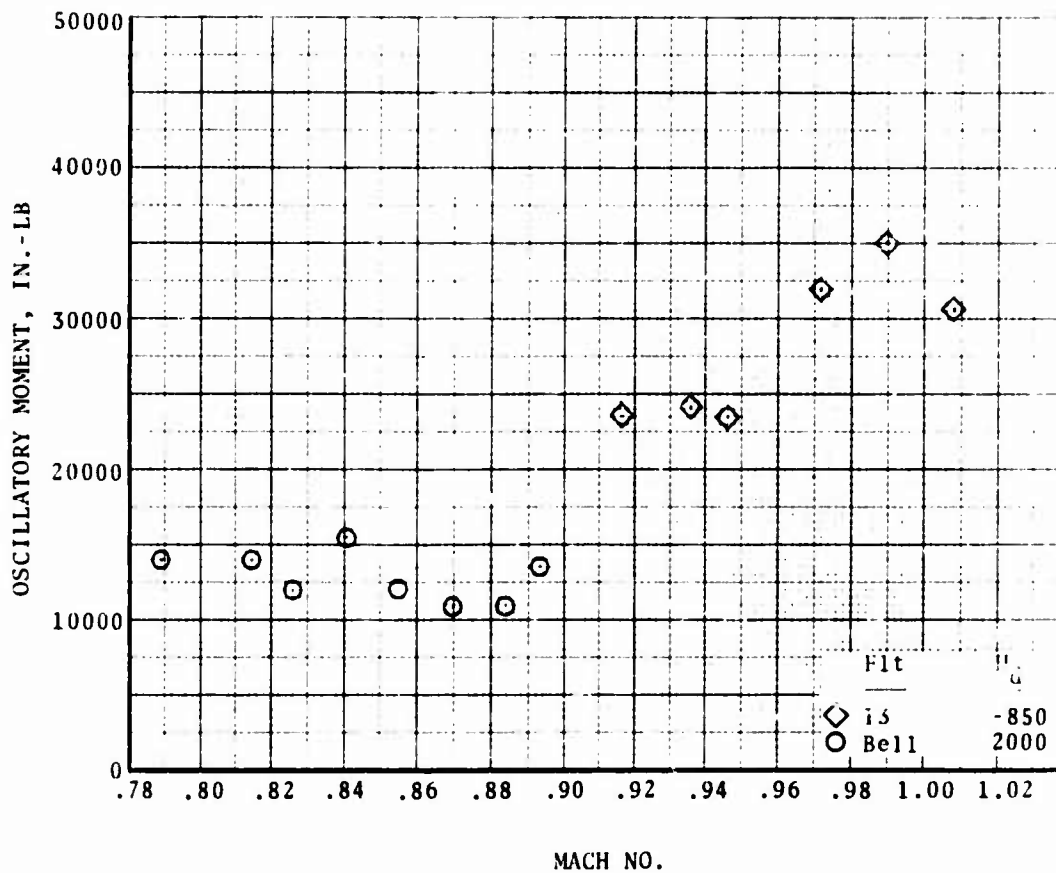




d) Station 11.0, 8500-lb Gross Weight

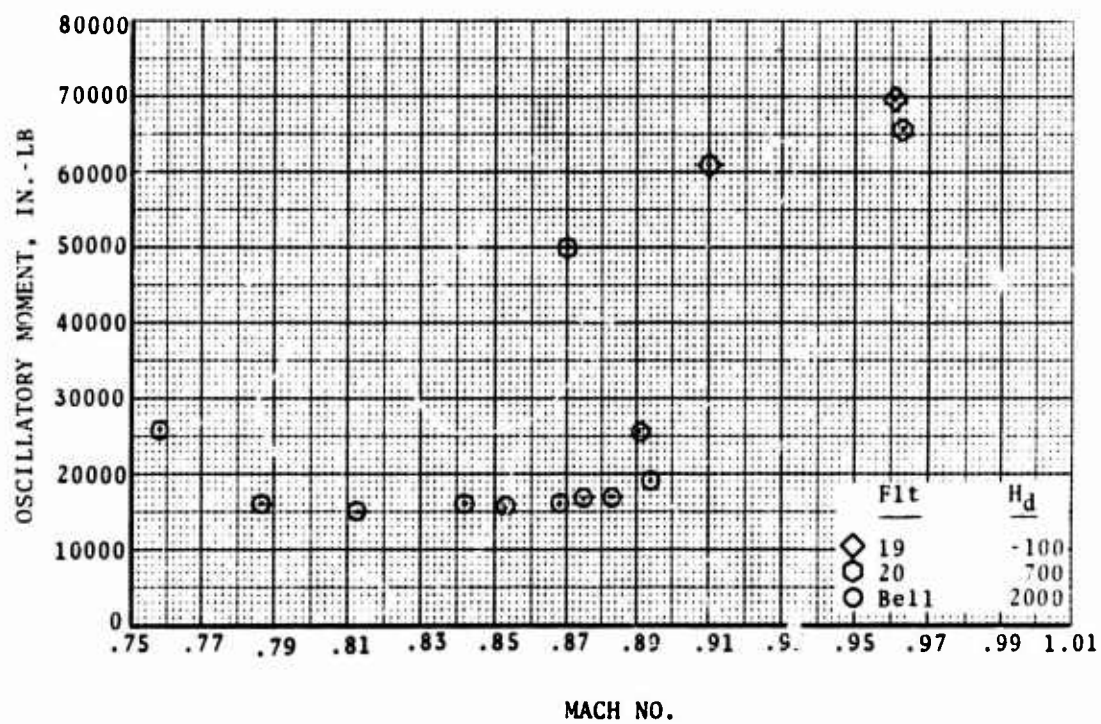
Figure C-26. (Concl'd)





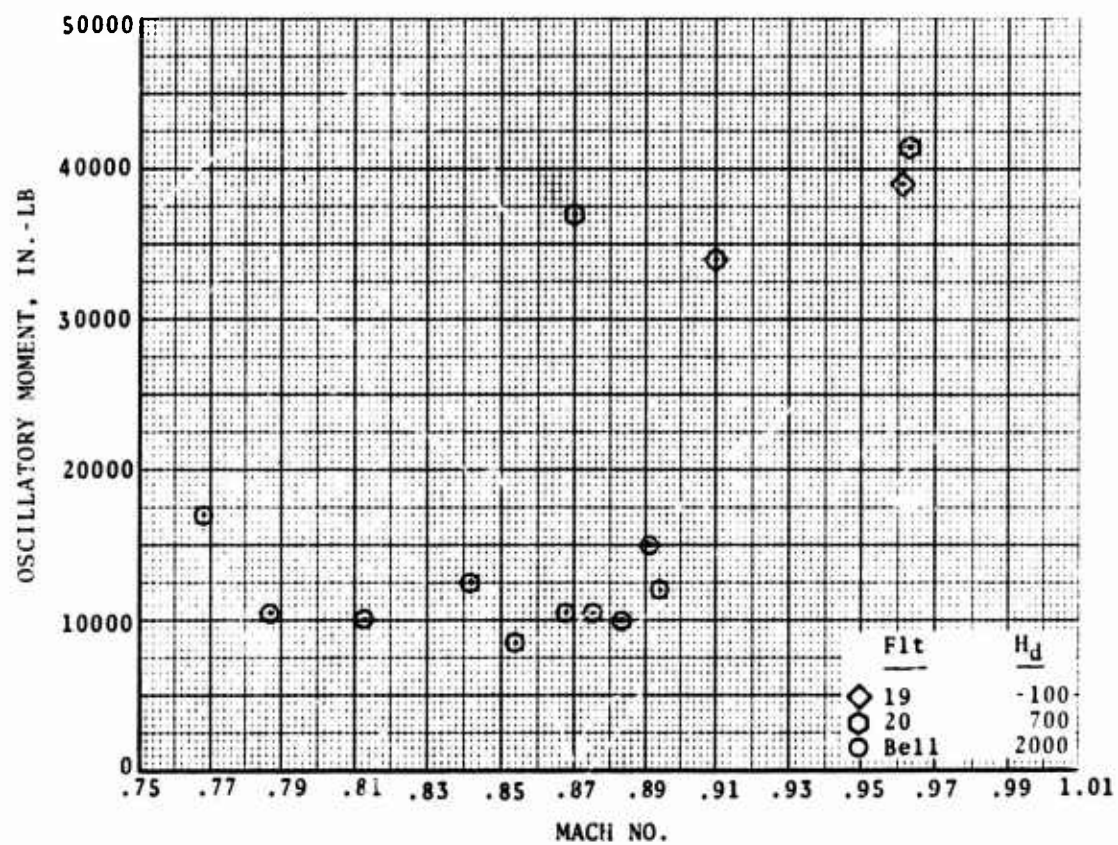
a) Station 192, 9500-lb Gross Weight

Figure C-27. Main Rotor Blade Chordwise Bending vs Mach Number for AFT C.G. and Various Density Altitudes by Station and Gross Weight.



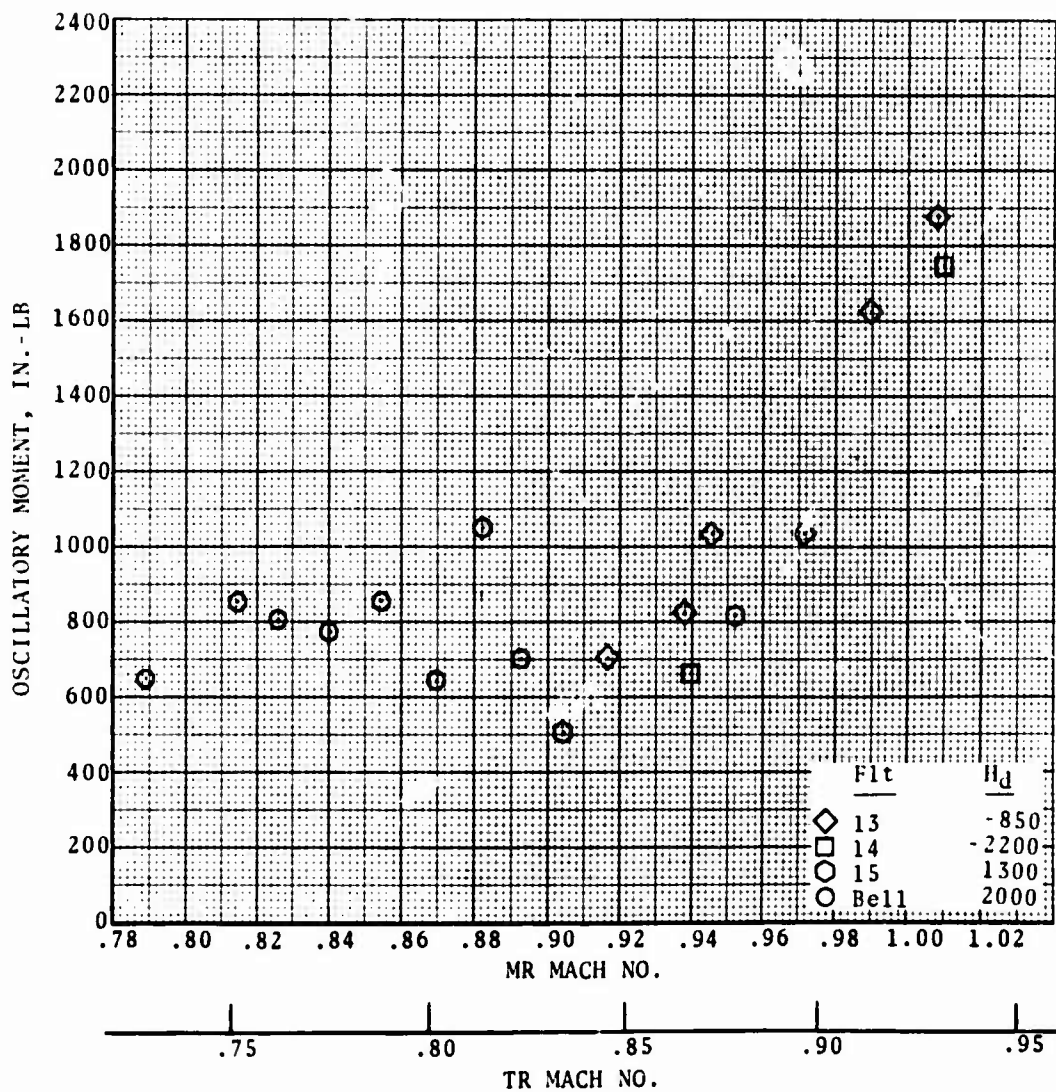
c) Station 150, 8500-lb Gross Weight

Figure C-27. (Concl'd)



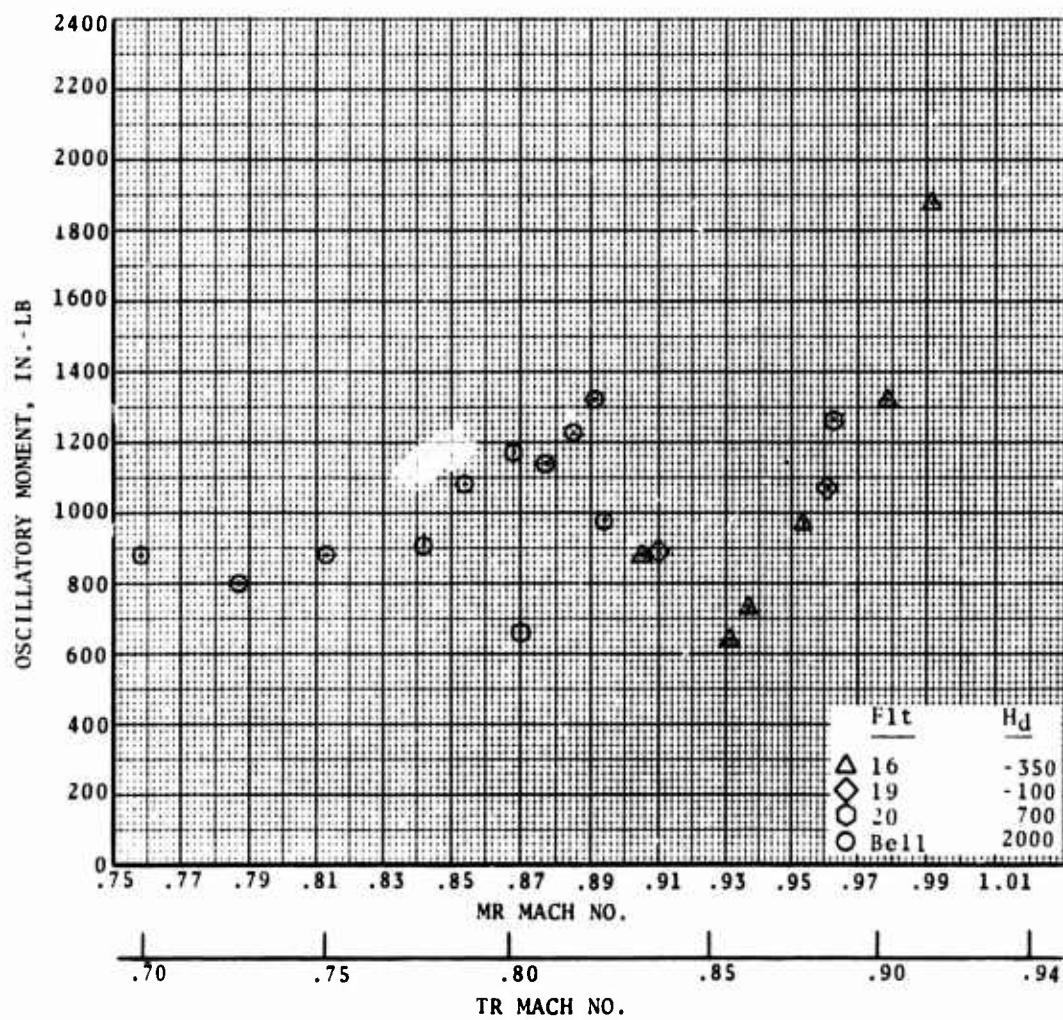
b) Station 192, 8500-lb Gross Weight

Figure C-27. (Cont'd)



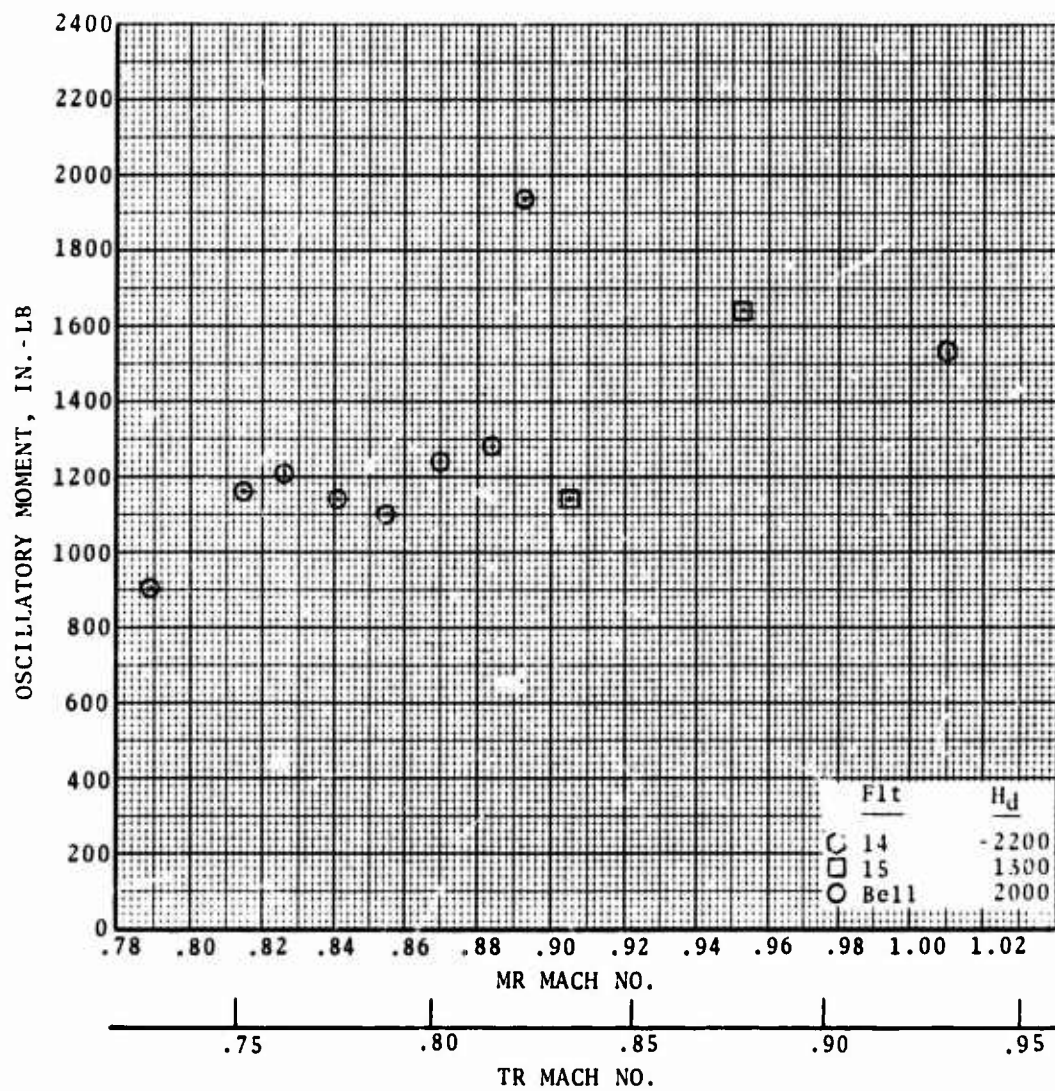
a) Station 21.5, 9500-lb Gross Weight

Figure C-28. Tail Rotor Blade Chordwise Bending vs Mach Number for AFT C.G. and Various Density Altitudes by Station and Gross Weight.



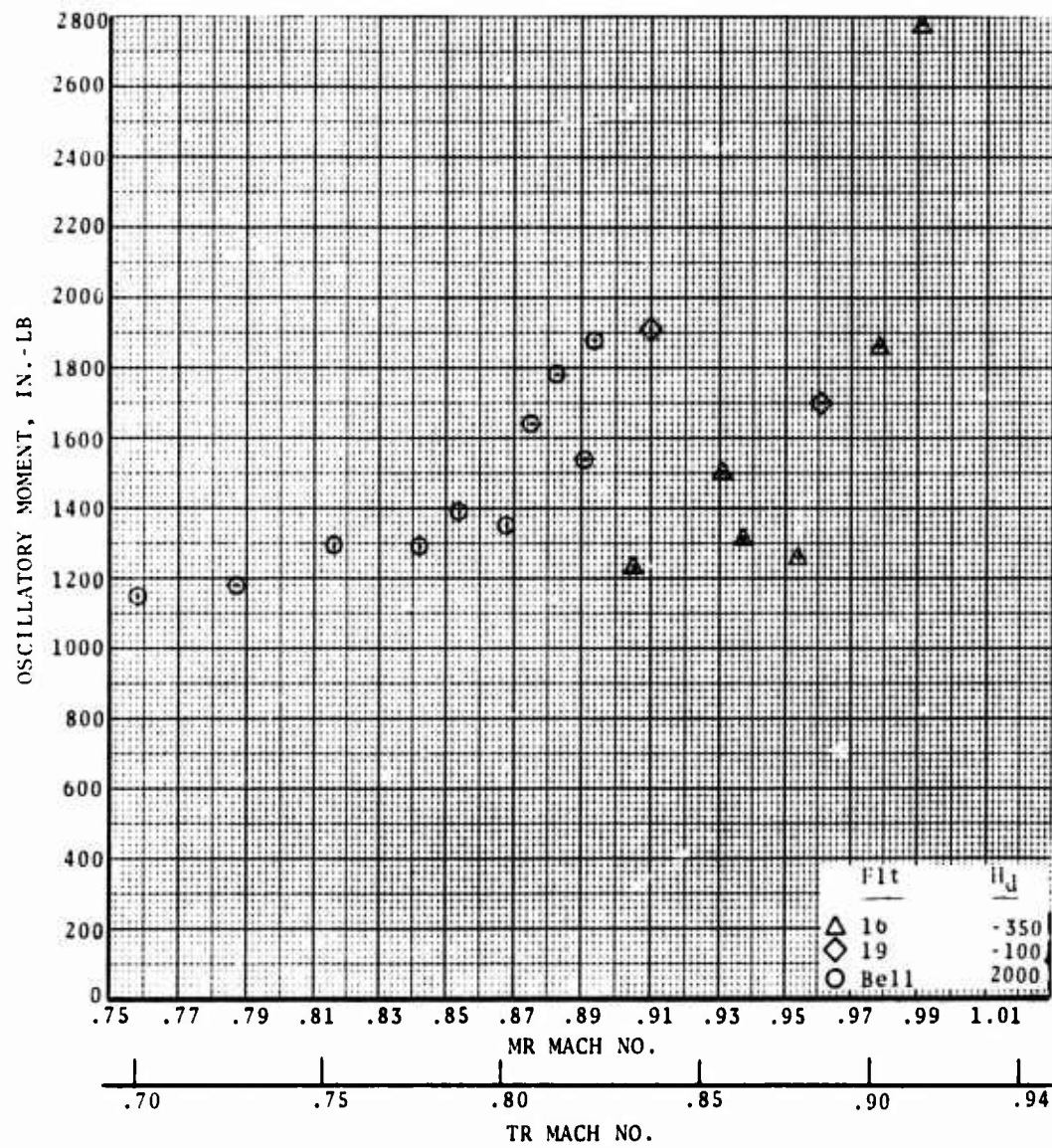
b) Station 21.5, 8500-lb Gross Weight

Figure C-28. (Cont'd)



c) Station 11.0, 9500-lb Gross Weight

Figure C-28. (Cont'd)



d) Station 11.0, 8500-lb Gross Weight

Figure C-28. (Concl'd)



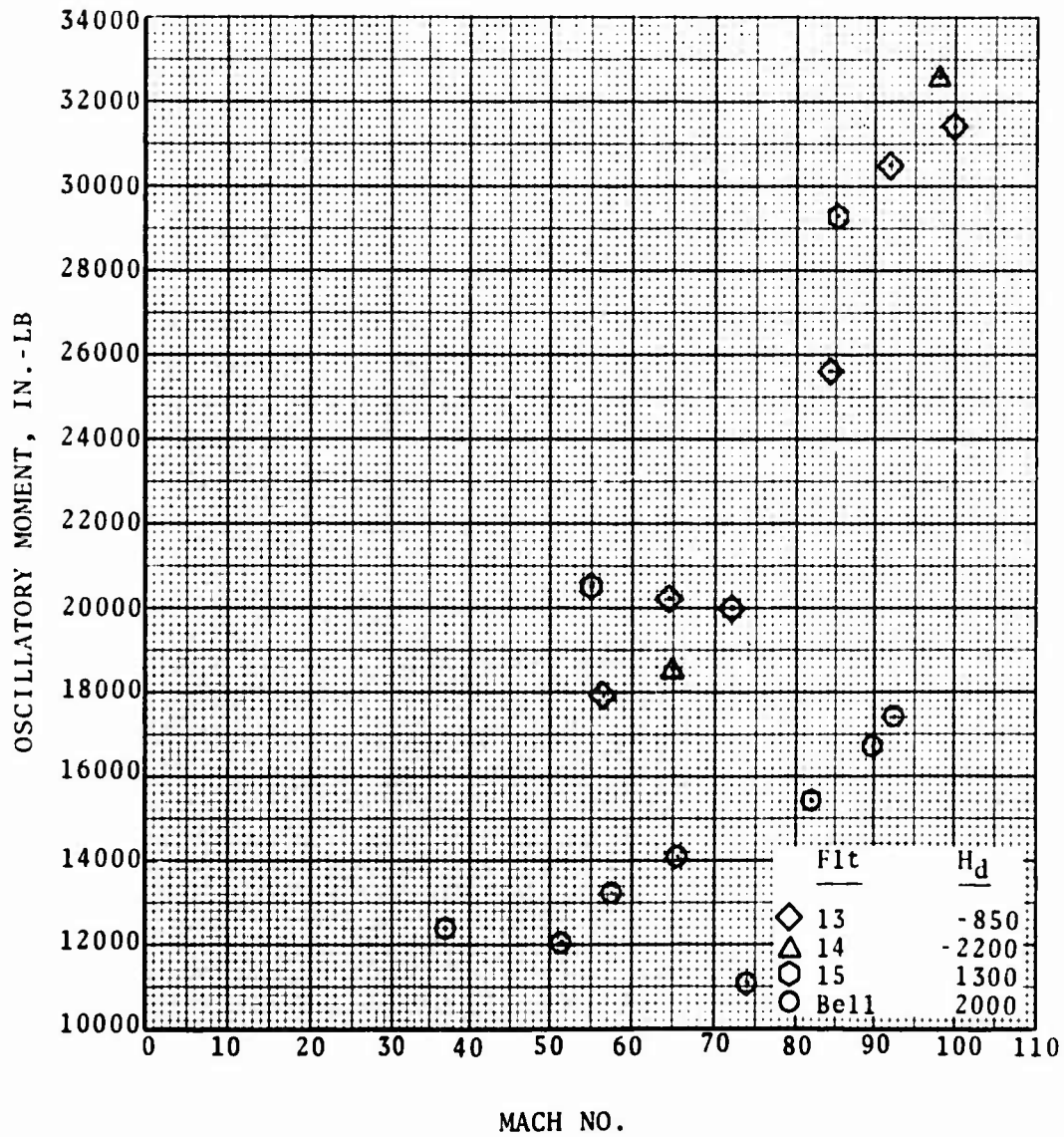


Figure C-29. Main Rotor Blade Beamwise Bending at Station 35 vs Mach Number for 9500-lb Gross Weight and AFT C.G. Position.



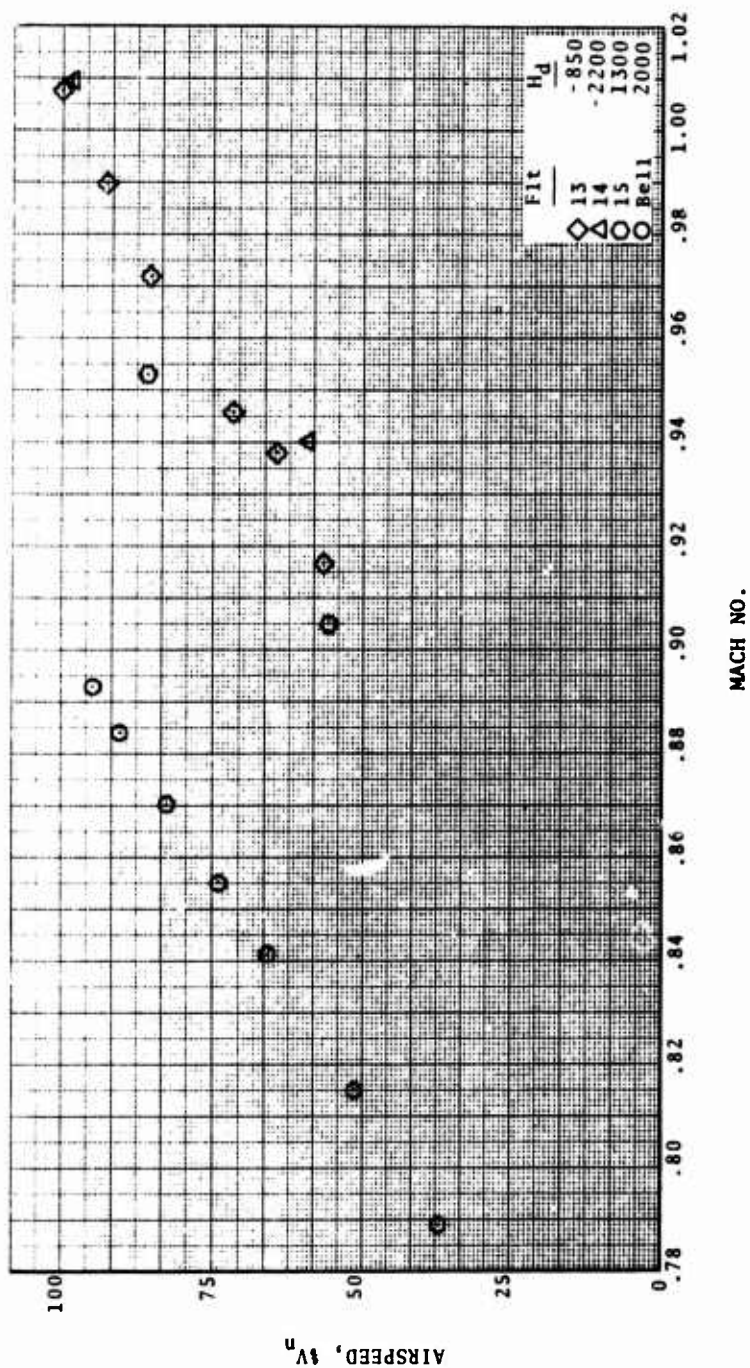


Figure C-30. Airspeed Percentage vs Mach Number for 9500-lb Gross Weight and AFT C.G. Position.

## APPENDIX D

### COMPONENT LOADS DATA

In a breakdown by flight number where each flight is further identified by aircraft gross weight and c.g. position, this appendix lists the mean and oscillatory loads for each helicopter component as applicable under the flight condition headings of airspeed, torque pressure, outside air temperature, rotor speed, and density altitude.

# FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | FLAT PITCH |           | FLAT PITCH |           | FLAT PITCH |           |
|-------------|------------|-----------|------------|-----------|------------|-----------|
|             | 0 KTS      | 248.0 RPM | 0 KTS      | 306.0 RPM | 0 KTS      | 312.0 RPM |
|             | 17.99 PSI  | -6128 FT  | 28.49 PSI  | -6128 FT  | 27.7 PSI   | -6128 FT  |
|             | -40.0 °F   |           | -40.0 °F   |           | -40.0 °F   |           |
|             | MEAN       | OSC       | MEAN       | OSC       | MEAN       | OSC       |
| MR CH 192   | -          | -         | -          | -         | -          | -         |
| MR BM 192   | 2188.90    | 7817.50   | 2063.82    | 3439.70   | 2001.28    | 3127.00   |
| MR CH 150   | -          | -         | -          | -         | -          | -         |
| MR BM 150   | 4281.89    | 3238.86   | 5050.43    | 2964.38   | 5160.22    | 3183.97   |
| MR BM 35    | -52671.35  | 15659.05  | -          | -         | -          | -         |
| DRAG BRACE  | 3183.30    | 1768.50   | -          | -         | 5942.16    | 1131.84   |
| SCISR LK    | 83.98      | 72.16     | 184.76     | 146.96    | 197.35     | 188.96    |
| LONG TUBE   | -          | -         | -          | -         | -          | -         |
| LAT TUBE    | -25.86     | 452.52    | 0          | 168.08    | -25.86     | 323.22    |
| COLL TUBE   | 181.92     | 97.02     | 303.20     | 118.25    | 303.20     | 169.79    |
| TR CH 11    | -          | -         | -          | -         | -          | -         |
| TR BM 11    | -950.85    | 845.20    | -1003.68   | 1267.80   | -919.16    | 1162.15   |
| TR CH 21.5  | 3729.99    | 1439.13   | 8487.93    | 881.10    | 8282.34    | 881.10    |
| TR BM 21.5  | 375.54     | 268.24    | 467.50     | 306.56    | 413.86     | 298.90    |
| TR SFT TRQ  | 470.74     | 1987.59   | 4602.84    | 1046.10   | 1325.06    | 592.79    |
| CG LONG ACC | .047       |           | .064/.040  |           | .027       |           |
| CG LAT ACC  | .081/.062  |           | .067       |           | .057       |           |
| CG VRT ACC  | 1.186      |           | 1.180      |           | 1.148      |           |

## FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | FLAT PITCH |           | IGE HOVER   |           | IGE HOVER |           |
|-------------|------------|-----------|-------------|-----------|-----------|-----------|
|             | 0 KTS      | 326.0 RPM | 0 KTS       | 322.0 RPM | 0 KTS     | 305.0 RPM |
|             | 31.04 PSI  | -6128 FT  | 36.8 PSI    | -6128 FT  | 35.4 PSI  | -6128 FT  |
|             | -40.0 °F   |           | -40.0 °F    |           | -40.0 °F  |           |
|             | MEAN       | OSC       | MEAN        | OSC       | MEAN      | OSC       |
| MR CH 192   | -          | -         | -           | -         | -         | -         |
| MR BM 192   | 1876.20    | 3127.00   | -2439.06    | 2313.98   | -1438.42  | 3502.24   |
| MR CH 150   | -          | -         | -           | -         | -         | -         |
| MR BM 150   | 4885.74    | 3568.24   | 3732.93     | 1921.36   | 3458.45   | 2470.32   |
| MR BM 35    | -          | -         | 33595.78    | 7117.75   | 41282.95  | 9964.85   |
| DRAG BRACE  | 6437.34    | 1202.58   | 5234.76     | 2263.68   | 4598.10   | 2122.20   |
| SCISR LK    | 214.15     | 125.97    | 96.58       | 172.16    | 54.59     | 167.96    |
| LONG TUBE   | -          | -         | -           | -         | -         | -         |
| LAT TUBE    | -51.72     | 168.08    | 0           | 258.58    | -25.86    | 323.22    |
| COLL TUBE   | 333.52     | 166.76    | 142.50      | 60.64     | 93.99     | 84.90     |
| TR CH 11    | -          | -         | -           | -         | -         | -         |
| TR BM 11    | -971.98    | 1331.19   | 253.56      | 1214.98   | 274.69    | 1257.24   |
| TR CH 21.5  | 2226.84    | 734.25    | 2386.71     | 881.10    | 1722.48   | 881.10    |
| TR BM 21.5  | 482.83     | 206.93    | -222.26     | 306.56    | -268.24   | 544.14    |
| TR SFT TRQ  | 924.06     | 749.70    | 2650.12     | 540.48    | 283.98    | 523.05    |
| CG LONG ACC | .037       |           | .157/.144   |           | .147      |           |
| CG LAT ACC  | .064       |           | .017/- .017 |           | .022/.007 |           |
| CG VRT ACC  | 1.167      |           | 1.180/1.161 |           | 1.161     |           |

FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | LEFT HOVERING TURN |           | RIGHT HOVERING TURN |           | VERTICAL TAKEOFF |           |
|-------------|--------------------|-----------|---------------------|-----------|------------------|-----------|
|             | 0 KTS              | 319.0 RPM | 0 KTS               | 321.0 RPM | 0 KTS            | 319.0 RPM |
|             | 37.7 PSI           | -6128 FT  | 37.7 PSI            | -6128 FT  | 34.0 PSI         | -6128 FT  |
|             | -40.0 °F           |           | -40.0 °F            |           | -40.0 °F         |           |
|             | MEAN               | OSC       | MEAN                | OSC       | MEAN             | OSC       |
| MR CH 192   | -                  | -         | -                   | -         | -                | -         |
| MR BM 192   | -875.56            | 3069.46   | -1500.96            | 3564.78   | -2501.60         | 4627.96   |
| MR CH 150   | -                  | -         | -                   | -         | -                | -         |
| MR BM 150   | 4172.10            | 2635.01   | 3842.72             | 3678.03   | 2964.38          | 3019.28   |
| MR BM 35    | 3311.07            | 8826.01   | 34734.62            | 14520.21  | 40144.11         | 18506.15  |
| DRAG BRACE  | 5446.98            | 1697.76   | 5305.50             | 2122.20   | 5305.50          | 2000.34   |
| SCISR LK    | 109.17             | 125.97    | 88.18               | 159.56    | 113.37           | 163.76    |
| LONG TUBE   | -                  | -         | -                   | -         | 374.28           | 227.24    |
| LAT TUBE    | -51.72             | 258.58    | -64.64              | 323.22    | 103.43           | 349.08    |
| COL. TUBE   | 166.76             | 72.77     | 142.50              | 90.96     | 157.66           | 90.96     |
| TR CH 11    | -                  | -         | -                   | -         | -                | -         |
| TR BM 11    | 507.12             | 1605.88   | 243.00              | 1310.06   | 158.48           | 1426.28   |
| TR CH 21.5  | 2299.73            | 1262.91   | 2191.41             | 851.10    | 2387.84          | 910.47    |
| TR BM 21.5  | -452.18            | 383.20    | -291.23             | 398.53    | -214.59          | 582.46    |
| TR SFT TRQ  | 3399.82            | 889.18    | 2475.77             | 784.58    | 2528.08          | 662.53    |
| CG LONG ACC | .164/-.134         |           | .157/-.140          |           | .187/-.127       |           |
| CG LAT ACC  | .026/-.012         |           | .012/-.007          |           | .057/-.017       |           |
| CG VRT ACC  | 1.148              |           | 1.180/1.141         |           | 1.244/1.051      |           |

FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | HOVER TO FULL POWER CLIMB |           | FULL POWER CLIMB |           | LEVEL FLIGHT |           |
|-------------|---------------------------|-----------|------------------|-----------|--------------|-----------|
|             | 0 KTS                     | 320.0 RPM | 0 KTS            | 319.0 RPM | 65.3 KTS     | 322.0 RPM |
|             | 45.0 PSI                  | -6128 FT  | 37.0 PSI         | -6128 FT  | 25.5 PSI     | -636 FT   |
|             | -40.0 °F                  |           | -40.0 °F         |           | 38.4 °F      |           |
|             | MEAN                      | OSC       | MEAN             | OSC       | MEAN         | OSC       |
| MR CH 192   | -                         | -         | -                | -         | -            | -         |
| MR BM 192   | 813.02                    | 6816.86   | -1813.66         | 8505.44   | -3314.62     | 7754.96   |
| MR CH 150   | -                         | -         | -                | -         | -            | -         |
| MR BM 150   | 5105.33                   | 5764.08   | 4501.47          | 5105.33   | 3019.28      | 7410.96   |
| MR BM 35    | 37581.72                  | 25054.48  | 53240.77         | 14235.50  | 37012.30     | 17936.73  |
| DRAG BRACE  | 4739.58                   | 3395.52   | 4739.58          | 5729.94   | 5942.16      | 6012.90   |
| SCISR LK    | 100.78                    | 188.96    | 88.18            | 440.90    | 12.60        | 461.89    |
| LONG TUBE   | -                         | -         | -                | -         | -            | -         |
| LAT TUBE    | 64.64                     | 400.80    | -12.93           | 568.88    | -12.93       | 387.87    |
| COLL TUBE   | 184.95                    | 169.79    | 97.02            | 151.60    | 69.74        | 209.21    |
| TR CH 11    | -                         | -         | -                | -         | -            | -         |
| TR BM 11    | 919.16                    | 1806.62   | 380.34           | 2007.35   | -591.64      | 1204.41   |
| TR CH 21.5  | 2230.94                   | 1174.80   | 2064.77          | 558.03    | 2915.37      | 704.88    |
| TR BM 21.5  | -697.42                   | 567.14    | -306.56          | 421.52    | 168.61       | 344.88    |
| TR SFT TRQ  | 3138.30                   | 523.05    | 2702.42          | 540.48    | 1098.40      | 627.66    |
| CG LONG ACC | .217/-.114                |           | .177/-.100       |           | .030         |           |
| CG LAT ACC  | .076/-.026                |           | .010/-.005       |           | 0            |           |
| CG VRT ACC  | 1.174/.949                |           | 1.174/.968       |           | 1.071        |           |

FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |           | LEFT TURN |           | RIGHT TURN  |           |
|-------------|--------------|-----------|-----------|-----------|-------------|-----------|
|             | 74.7 KTS     | 323.0 RPM | 74.7 KTS  | 322.0 RPM | 73.2 KTS    | 322.0 RPM |
|             | 25.4 PSI     | - 664 FT  | 25.3 PSI  | - 702 FT  | 26.2 PSI    | - 648 FT  |
|             | -40.14 °F    |           | -40.87 °F |           | -39.42 °F   |           |
|             | MEAN         | OSC       | MEAN      | OSC       | MEAN        | OSC       |
| MR CH 192   | -            | -         | -         | -         | -           | -         |
| MR BM 192   | -4002.56     | 9693.70   | -4002.56  | 9381.00   | -3814.94    | 8505.44   |
| MR CH 150   | -            | -         | -         | -         | -           | -         |
| MR BM 150   | 2415.42      | 8234.40   | 2799.70   | 8783.36   | 3952.51     | 7685.44   |
| MR BM 35    | 35588.75     | 20214.41  | 36727.59  | 22207.38  | 33595.78    | 17082.60  |
| DRAG BRACE  | 5942.16      | 6578.82   | 5800.68   | 6791.04   | 5729.94     | 5659.20   |
| SCISR LK    | -16.80       | 428.70    | 4.20      | 361.89    | -37.79      | 453.49    |
| LONG TUBE   | -            | -         | -         | -         | -           | -         |
| LAT TUBE    | -51.72       | 452.52    | 0         | 387.87    | -25.86      | 452.52    |
| COLL TUBE   | 75.80        | 281.98    | 57.61     | 288.04    | 51.54       | 269.85    |
| TR CH 11    | -            | -         | -         | -         | -           | -         |
| TR BM 11    | -475.42      | 1162.15   | -475.42   | 1500.23   | -454.30     | 1172.72   |
| TR CH 21.5  | 2875.59      | 822.36    | 2886.00   | 1027.95   | 2915.37     | 616.77    |
| TR BM 21.5  | 153.28       | 329.55    | 130.29    | 344.88    | 91.97       | 352.54    |
| TR SFT TRQ  | 1307.62      | 575.36    | 1220.45   | 627.66    | 1290.19     | 627.66    |
| CG LONG ACC | 0            |           | .013      |           | .027        |           |
| CG LAT ACC  | 0            |           | -.010     |           | .032/0      |           |
| CG VRT ACC  | 0            |           | 1.032     |           | 1.090/1.026 |           |

FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | LEFT SIDESLIP |           | RIGHT SIDESLIP |           | S-TURN      |           |
|-------------|---------------|-----------|----------------|-----------|-------------|-----------|
|             | 75.1 KTS      | 322.0 RPM | 77.5 KTS       | 322.0 RPM | 74.7 KTS    | 322.0 RPM |
|             | 31.7 PSI      | - 763 FT  | 28.2 PSI       | - 844 FT  | 35.97 PSI   | - 799 FT  |
|             | -40.29 °F     |           | -42.32 °F      |           | -40.87 °F   |           |
|             | MEAN          | OSC       | MEAN           | OSC       | MEAN        | OSC       |
| MR CH 192   | -             | -         | -              | -         | -           | -         |
| MR BM 192   | -3814.94      | 8755.60   | -4252.72       | 7880.04   | -4315.26    | 10068.94  |
| MR CH 150   | -             | -         | -              | -         | -           | -         |
| MR BM 150   | 2525.22       | 8289.30   | 3678.03        | 8508.88   | 3019.28     | 8728.46   |
| MR BM 35    | 35588.75      | 17652.02  | 36727.59       | 18790.86  | 35873.46    | 18506.15  |
| DRAG BRACE  | 5659.20       | 5800.68   | 5942.16        | 6295.86   | 6083.64     | 6791.04   |
| SCISR LK    | -21.00        | 436.70    | 0              | 445.09    | 8.40        | 440.90    |
| LONG TUBE   | -             | -         | -              | -         | -           | -         |
| LAT TUBE    | -12.93        | 439.59    | -155.15        | 452.52    | 1383.40     | 413.73    |
| COLL TUBE   | 21.22         | 269.85    | 66.70          | 288.04    | 78.83       | 285.01    |
| TR CH 11    | -             | -         | -              | -         | -           | -         |
| TR BM 11    | -549.38       | 1389.66   | -169.04        | 1531.92   | -496.56     | 1732.66   |
| TR CH 21.5  | 2239.86       | 763.62    | 3150.33        | 1204.17   | 3003.48     | 998.58    |
| TR BM 21.5  | 61.31         | 421.52    | 22.99          | 505.82    | 114.96      | 482.83    |
| TR SFT TRQ  | 784.58        | 802.01    | 2266.55        | 610.22    | 941.49      | 1150.71   |
| CG LONG ACC | -.022/- .030  |           | .057           |           | .030/- .017 |           |
| CG LAT ACC  | -.043/- .060  |           | .091/- .064    |           | .019/- .031 |           |
| CG VRT ACC  | 1.064         |           | 1.116/1.128    |           | 1.084/.936  |           |

FLIGHT 13, 9500-LB., AFT C.G.

|             | LEVEL FLIGHT |           | LEVEL FLIGHT |           | LEVEL FLIGHT |           |
|-------------|--------------|-----------|--------------|-----------|--------------|-----------|
|             | 83.1 KTS     | 321.0 RPM | 97.7 KTS     | 320.0 RPM | 106.6 KTS    | 320.0 RPM |
|             | 30.5 PSI     | - 707 FT  | 34.4 PSI     | - 799 FT  | 45.0 PSI     | - 877 FT  |
|             | -39.13 °F    |           | -40.87 °F    |           | -42.75 °F    |           |
| PARAMETER   | MEAN         | OSC       | MEAN         | OSC       | MEAN         | OSC       |
| MR CH 192   | -            | -         | -            | -         | -            | -         |
| MR BM 192   | -4252.72     | 9693.70   | -4878.12     | 11569.90  | -4252.72     | 13070.86  |
| MR CH 150   | -            | -         | -            | -         | -            | -         |
| MR BM 150   | 2525.22      | 9387.22   | 2086.05      | 12845.66  | 2195.84      | 1388.69   |
| MR BM 35    | 31887.52     | 19929.70  | 37581.72     | 25623.9   | 33311.07     | 30463.97  |
| DRAG BRACE  | 5305.50      | 6366.60   | 5376.24      | 7922.88   | 5093.28      | 8842.50   |
| SCISR LK    | -12.60       | 436.70    | 79.78        | 470.29    | 50.39        | 625.65    |
| LONG TUBE   | -            | -         | -            | -         | -            | -         |
| LAT TUBE    | -77.57       | 387.87    | -51.72       | 724.02    | 12.93        | 1163.61   |
| COLL TUBE   | 3.03         | 269.85    | 21.22        | 121.28    | 6.06         | 439.64    |
| TR CH 11    | -            | -         | -            | -         | -            | -         |
| TR BM 11    | -295.82      | 1267.80   | -179.60      | 1172.72   | 0            | 1700.96   |
| TR CH 21.5  | 3101.88      | 1027.95   | 3112.04      | 1027.95   | 2671.50      | 1615.35   |
| TR BM 21.5  | 15.33        | 390.86    | -53.65       | 559.47    | -237.58      | 804.72    |
| TR SFT TRQ  | 1272.76      | 627.66    | 1499.41      | 802.01    | 1481.98      | 958.92    |
| CG LONG ACC | -.013        |           | -.050        |           | -.037/-.057  |           |
| CG LAT ACC  | -.010        |           | -.002        |           | -.014        |           |
| CG VRT ACC  | 1.090/1.032  |           | 1.006        |           | 1.032/1      |           |

FLIGHT 13, 9500-LB., AFT C.G.

|             | LEFT TURN   |           | RIGHT TURN  |           | CYCLIC PULL-UP |           |
|-------------|-------------|-----------|-------------|-----------|----------------|-----------|
|             | 108.1 KTS   | 319.0 RPM | 107.4 KTS   | 318.0 RPM | 92.1 KTS       | 323.0 RPM |
|             | 45.0 PSI    | - 894 FT  | 45.0 PSI    | -1209 FT  | 45.0 PSI       | - 965 FT  |
|             | -42.90 °F   |           | -44.20 °F   |           | -44.06 °F      |           |
| PARAMETER   | MEAN        | OSC       | MEAN        | OSC       | MEAN           | OSC       |
| MR CH 192   | -           | -         | -           | -         | -              | -         |
| MR BM 192   | -4753.04    | 14509.28  | -4690.50    | 13446.10  | -5128.28       | 13446.10  |
| MR CH 150   | -           | -         | -           | -         | -              | -         |
| MR BM 150   | 3019.28     | 14272.96  | 2031.15     | 13449.52  | 1591.98        | 15645.36  |
| MR BM 35    | 39574.69    | 33029.36  | 39005.27    | 32172.23  | 43845.34       | 35588.75  |
| DRAG BRACE  | 4739.58     | 8630.28   | 4810.32     | 7993.62   | 6083.64        | 10964.70  |
| SCISR LK    | -4.20       | 697.03    | -46.19      | 608.86    | 71.38          | 625.65    |
| LONG TUBE   | -           | -         | -           | -         | -              | -         |
| LAT TUBE    | 77.57       | 1267.04   | -25.86      | 1111.89   | 12.93          | 1111.89   |
| COLL TUBE   | 48.51       | 451.77    | 6.06        | 448.74    | 45.48          | 482.09    |
| TR CH 11    | -           | -         | -           | -         | -              | -         |
| TR BM 11    | 211.30      | 1774.92   | 179.60      | 1817.18   | -211.30        | 1214.98   |
| TR CH 21.5  | 2740.28     | 1174.80   | 3366.96     | 1027.95   | 2758.11        | 1204.17   |
| TR BM 21.5  | -344.88     | 728.08    | -237.58     | 712.75    | -76.64         | 498.16    |
| TR SFT TRQ  | 1394.80     | 889.18    | 1551.72     | 802.01    | 1481.98        | 941.49    |
| CG LONG ACC | -.054/-.077 |           | -.054/-.067 |           | -.040/-.070    |           |
| CG LAT ACC  | -.033/-.064 |           | 0/-.024     |           | 0/-.038        |           |
| CG VRT ACC  | 1.019/.962  |           | 1.045/.987  |           | 1.038/.801     |           |

FLIGHT 13, 9500-LB., AFT C.G.

| PARAMETER   | COLLECTIVE PULL-UP |           | S-TURN       |           | LEVEL FLIGHT |           |
|-------------|--------------------|-----------|--------------|-----------|--------------|-----------|
|             | 104.9 KTS          | 320.0 RPM | 106.1 KTS    | 318.0 RPM | 115.0 KTS    | 320.0 RPM |
|             | 45.0 PSI           | -1009 FT  | - PSI        | -1007 FT  | 45.0 PSI     | -1198 FT  |
|             | -44.35 °F          |           | -44.06 °F    |           | -44.93 °F    |           |
|             | MEAN               | OSC       | MEAN         | OSC       | MEAN         | OSC       |
| MR CH 192   | -                  | -         | -            | -         | -            | -         |
| MR BM 192   | 3940.02            | 13696.26  | 1813.66      | 11945.14  | -5691.14     | 15197.22  |
| MR CH 150   | -                  | -         | -            | -         | -            | -         |
| MR BM 150   | 823.44             | 14876.82  | 1701.78      | 14767.02  | 1207.71      | 15096.40  |
| MR BM 35    | 37012.30           | 31602.81  | 6578.82      | 9549.90   | 36158.17     | 31318.10  |
| DRAG BRACE  | 4598.10            | 8347.32   | 6578.82      | 9549.90   | 4527.36      | 8135.10   |
| SCISR LK    | 62.98              | 680.24    | 134.37       | 734.82    | 226.75       | 709.63    |
| LONG TUBE   | -                  | -         | -            | -         | -            | -         |
| LAT TUBE    | 0                  | 969.68    | -38.79       | 1435.12   | -25.86       | 1603.20   |
| COLL TUBE   | -24.26             | 418.42    | -            | -         | 12.13        | 636.72    |
| TR CH 11    | -                  | -         | -            | -         | -            | -         |
| TR BM 11    | 306.38             | 1996.78   | 190.17       | 1859.44   | 306.38       | 1764.36   |
| TR CH 21.5  | 3963.78            | 1174.80   | 3396.34      | 1497.87   | 3288.26      | 1879.68   |
| TR BM 21.5  | -429.18            | 766.40    | -344.88      | 804.72    | -360.21      | 689.76    |
| TR SFT TRQ  | 1586.58            | 54.32     | 1935.28      | 1028.66   | 1830.68      | 1133.28   |
| CG LONG ACC | -.023/- .060       |           | -.037/- .057 |           | -.090        |           |
| CG LAT ACC  | -.012/- .036       |           | .038/.007    |           | -.031        |           |
| CG VRT ACC  | 1.090/.923         |           | 1.071/.910   |           | 1.038        |           |

FLIGHT 13, 9500-LB. AFT C.G.

| PARAMETER   | PARTIAL POWER DESCENT |           | APPROACH     |           | LANDING     |           |
|-------------|-----------------------|-----------|--------------|-----------|-------------|-----------|
|             | 69.1 KTS              | 325.0 RPM | 0 KTS        | 323.0 RPM | 0 KTS       | 324.0 RPM |
|             | 10.3 PSI              | -3670 FT  | 18.8 PSI     | -6128 FT  | 34.4 PSI    | -6128 FT  |
|             | -51.01 °F             |           | -40.0 °F     |           | -40.0 °F    |           |
|             | MEAN                  | OSC       | MEAN         | OSC       | MEAN        | OSC       |
| MR CH 192   | -                     | -         | -            | -         | -           | -         |
| MR BM 192   | -3252.08              | 7692.42   | -3627.32     | 20388.04  | -2439.06    | 4127.64   |
| MR CH 150   | -                     | -         | -            | -         | -           | -         |
| MR BM 150   | 1756.67               | 5599.39   | 4281.89      | 14876.82  | 2470.32     | 3403.55   |
| MR BM 35    | 25339.19              | 23346.22  | 28471.00     | 57942.00  | 25623.90    | 14520.21  |
| DRAG BRACE  | 7922.88               | 6508.08   | 7215.48      | 9479.16   | 6649.56     | 5546.98   |
| SCISR LK    | 201.55                | 382.11    | 260.34       | 676.04    | 209.95      | 377.91    |
| LONG TUBE   | -                     | -         | -            | -         | -           | -         |
| LAT TUBE    | -129.29               | 517.16    | 0            | 917.96    | 0           | 258.58    |
| COLL TUBE   | 191.02                | 181.92    | 172.82       | 385.06    | 175.86      | 106.12    |
| TR CH 11    | -                     | -         | -            | -         | -           | -         |
| TR BM 11    | 1162.15               | 1457.97   | -1024.80     | 1785.48   | 232.43      | 1531.92   |
| TR CH 21.5  | 3794.24               | 1027.95   | 2934.33      | 1762.20   | 2953.16     | 1027.95   |
| TR BM 21.5  | 636.11                | 452.18    | 482.83       | 536.48    | 53.65       | 582.46    |
| TR SFT TRQ  | 802.01                | 958.92    | 784.58       | 348.70    | 1900.42     | 802.01    |
| CG LONG ACC | .007/- .010           |           | .100/.017    |           | .033/- .160 |           |
| CG LAT ACC  | .010                  |           | -.007/- .055 |           | .072/- .072 |           |
| CG VRT ACC  | 1.032/1.006           |           | 1.090/.936   |           | 1.128/.884  |           |

FLIGHT 13, 9500-LB., AFT C.G.

IGE HOVER

0 KTS 322.0 RPM  
36.6 PSI -6128 FT  
-40.0 °F

| PARAMETER   | MEAN        | OSC      |
|-------------|-------------|----------|
| MR CH 192   | -           | -        |
| MR BM 192   | -1438.42    | 3314.62  |
| MR CH 150   | -           | -        |
| MR BM 150   | 3458.45     | 2744.80  |
| MR BM 35    | 37297.01    | 10534.27 |
| DRAG BRACE  | 6225.12     | 2829.60  |
| SCISR LK    | 184.76      | 167.96   |
| LONG TUBE   | -           | -        |
| LAT TUBE    | -51.72      | 71.51    |
| COLL TUBE   | 142.50      | 90.96    |
| TR CH 11    | -           | -        |
| TR BM 11    | 31.70       | 1373.45  |
| TR CH 21.5  | 2827.26     | 939.84   |
| TR BM 21.5  | -137.95     | 383.20   |
| TR SFT TRQ  | 2179.38     | 784.58   |
| CG LONG ACC | .117/.067   |          |
| CG LAT ACC  | -.005/-.036 |          |
| CG VRT ACC  | 1.084/1.051 |          |

FLIGHT 14, 9500-LB., AFT C.G.

ROTOR START

FLAT PITCH

FLAT PITCH

|                    |                   |                    |
|--------------------|-------------------|--------------------|
| 0 KTS 167.0 RPM    | 0 KTS 248.0 RPM   | 0 KTS 326.0 RPM    |
| 12.68 PSI -6165 FT | 8.17 PSI -6165 FT | 14.86 PSI -6165 FT |
| -40.0 °F           | -40.0 °F          | -40.0 °F           |

| PARAMETER   | MEAN        | OSC      | MEAN        | OSC     | MEAN        | OSC     |
|-------------|-------------|----------|-------------|---------|-------------|---------|
| MR CH 192   | -           | -        | -           | -       | -           | -       |
| MR BM 192   | 2199.71     | 7332.38  | 1733.11     | 8732.20 | 1599.79     | 6465.83 |
| MR CH 150   | -           | -        | -           | -       | -           | -       |
| MR BM 150   | 5246.23     | 7813.54  | 4967.18     | 5860.16 | 5915.97     | 2790.55 |
| MR BM 35    | -50688.74   | 17976.82 | -           | -       | -           | -       |
| DRAG BRACE  | 4764.14     | 2598.62  | 5719.09     | 3537.02 | 8662.08     | 3681.38 |
| SCISR LK    | 203.47      | 419.66   | 186.52      | 584.98  | 313.69      | 623.13  |
| LONG TUBE   | -           | -        | -           | -       | -           | -       |
| LAT TUBE    | 0           | 323.22   | 0           | 568.88  | 103.43      | 258.58  |
| COLL TUBE   | 172.09      | 159.80   | 190.53      | 138.28  | 331.88      | 122.92  |
| TR CH 11    | -           | -        | -           | -       | -           | -       |
| TR BM 11    | -331.24     | 2436.18  | 587.68      | 555.62  | -737.26     | 1581.38 |
| TR CH 21.5  | 2446.75     | 1090.14  | -46.40      | 1176.21 | -906.95     | 717.20  |
| TR BM 21.5  | 46.78       | 639.35   | 233.91      | 288.49  | 413.24      | 428.84  |
| TR SFT TRQ  | 610.22      | 1481.98  | 749.70      | 1621.46 | 1046.10     | 749.70  |
| CG LONG ACC | -.030/-.017 |          | -.023/-.033 |         | -.010/-.043 |         |
| CG LAT ACC  | .009        |          | -.019/-.009 |         | .019/0      |         |
| CG VRT ACC  | 1.032       |          | 1.032       |         | 1.032       |         |



FLIGHT 14, 9500-LB., AFT C.G.

| PARAMETER   | IGE HOVER   |           | IGE HOVER   |           | LEFT SIDEWARD FLIGHT |           |
|-------------|-------------|-----------|-------------|-----------|----------------------|-----------|
|             | 0 KTS       | 322.0 RPM | 0 KTS       | 306.0 RPM | 0 KTS                | 320.0 RPM |
|             | 44.97 PSI   | -6165 FT  | 43.03 PSI   | -6165 FT  | 46.92 PSI            | -6165 FT  |
|             | -40.0 °F    |           | -40.0 °F    |           | -40.0 °F             |           |
| PARAMETER   | MEAN        | OSC       | MEAN        | OSC       | MEAN                 | OSC       |
| MR CH 192   | -           | -         | -           | -         | -                    | -         |
| MR BM 192   | -1133.19    | 3732.85   | -866.55     | 4532.74   | 133.32               | 5665.93   |
| MR CH 150   | -           | -         | -           | -         | -                    | -         |
| MR BM 150   | 4608.12     | 2176.63   | 3962.58     | 1953.38   | 5134.61              | 3125.42   |
| MR BM 35    | 39490.07    | 10314.57  | 36543.05    | 11198.68  | 40374.17             | 17092.72  |
| DRAG BRACE  | 8517.71     | 4475.41   | 7218.40     | 4764.14   | 8084.61              | 4908.51   |
| SCISR LK    | 351.84      | 699.44    | 288.25      | 779.98    | 415.42               | 901.17    |
| LONG TUBE   | -           | -         | -           | -         | -                    | -         |
| LAT TUBE    | 25.86       | 400.80    | -38.79      | 297.37    | 38.79                | 323.22    |
| COLL TUBE   | 122.92      | 104.48    | 64.53       | 104.48    | 129.07               | 153.65    |
| TR CH 11    | -           | -         | -           | -         | -                    | -         |
| TR BM 11    | 331.24      | 1228.78   | 320.55      | 1260.83   | 299.18               | 1698.92   |
| TR CH 21.5  | -1440.41    | 745.89    | -1495.12    | 774.58    | -1359.25             | 831.95    |
| TR BM 21.5  | -233.91     | 460.02    | -311.83     | 405.44    | -179.33              | 600.37    |
| TR SFT TRQ  | 2283.98     | 854.32    | 2231.68     | 662.53    | 2266.55              | 924.06    |
| CG LONG ACC | .124/.097   |           | .117/.063   |           | .137/.090            |           |
| CG LAT ACC  | -.007/-.045 |           | -.012/-.035 |           | -.021/-.032          |           |
| CG VRT ACC  | 1.038       |           | 1.197       |           | 1.051/1.006          |           |

FLIGHT 14, 9500-LB., AFT C.G.

| PARAMETER   | RIGHT SIDEWARD FLIGHT |           | REARWARD FLIGHT |           | JUMP TAKEOFF |           |
|-------------|-----------------------|-----------|-----------------|-----------|--------------|-----------|
|             | 0 KTS                 | 321.0 RPM | 0 KTS           | 324.0 RPM | 0 KTS        | 321.0 RPM |
|             | 46.45 PSI             | -6165 FT  | 45.36 PSI       | -6165 FT  | 52.36 PSI    | -6165 FT  |
|             | -40.0 °F              |           | -40.0 °F        |           | -40.0 °F     |           |
| PARAMETER   | MEAN                  | OSC       | MEAN            | OSC       | MEAN         | OSC       |
| MR CH 192   | -                     | -         | -               | -         | -            | -         |
| MR BM 192   | -533.26               | 4866.03   | -1399.82        | 4866.03   | -1999.74     | 5332.54   |
| MR CH 150   | -                     | -         | -               | -         | -            | -         |
| MR BM 150   | 4911.37               | 3069.60   | 4130.01         | 4576.50   | 3850.96      | 3404.47   |
| MR BM 35    | 43026.49              | 11493.38  | 40079.47        | 13556.29  | 49804.64     | 19155.63  |
| DRAG BRACE  | 8156.79               | 6280.01   | 8301.16         | 6496.56   | 7074.03      | 5341.62   |
| SCISR LK    | 453.57                | 833.23    | 462.05          | 801.17    | 440.86       | 724.87    |
| LONG TUBE   | -                     | -         | -               | -         | -            | -         |
| LAT TUBE    | 25.86                 | 323.22    | -38.79          | 387.87    | 64.64        | 620.59    |
| COLL TUBE   | 144.43                | 107.555   | 119.85          | 116.77    | 104.48       | 73.75     |
| TR CH 11    | -                     | -         | -               | -         | -            | -         |
| TR BM 11    | 491.51                | 1645.49   | 235.07          | 1282.20   | 950.96       | 2382.76   |
| TR CH 21.5  | -1273.18              | 1147.52   | -1546.12        | 860.64    | -1359.25     | 1721.28   |
| TR BM 21.5  | -413.24               | 561.38    | -219.32         | 475.62    | -631.56      | 584.78    |
| TR SFT TRQ  | 3155.74               | 1011.23   | 2702.42         | 714.84    | 3277.78      | 906.62    |
| CG LONG ACC | .114/.090             |           | .110/.094       |           | .140/-.084   |           |
| CG LAT ACC  | -.016/-.045           |           | -.009/-.054     |           | -.007/-.061  |           |
| CG VRT ACC  | 1.057/1.032           |           | 1.044/1.013     |           | 1.197/.886   |           |

FLIGHT 14, 9500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |           | POWER TO AUTOROTATION |           | AUTO TO POWER |           |
|-------------|--------------|-----------|-----------------------|-----------|---------------|-----------|
|             | 68.6 KTS     | 323.0 RPM | 73.0 KTS              | 329.0 RPM | 108.0 KTS     | 323.0 RPM |
|             | 31.75 PSI    | -1893 FT  | 9.57 PSI              | -2195 FT  | 8.02 PSI      | -2946 FT  |
|             | -49.94 °F    |           | -50.35 °F             |           | -53.80 °F     |           |
| PARAMETER   | MEAN         | OSC       | MEAN                  | OSC       | MEAN          | OSC       |
| MR CH 192   | -            | -         | -                     | -         | -             | -         |
| MR BM 192   | -3466.22     | 9598.75   | -4666.06              | 8132.28   | -3866.16      | 10465.31  |
| MR CH 150   | -            | -         | -                     | -         | -             | -         |
| MR BM 150   | 2957.98      | 8929.76   | 1339.16               | 7534.48   | 3850.96       | 8539.08   |
| MR BM 35    | 37132.45     | 18566.23  | 39195.37              | 21807.95  | 44500.00      | 23576.16  |
| DRAG BRACE  | 9353.92      | 4258.86   | 12776.57              | 4908.51   | 9889.21       | 4186.67   |
| SCISR LK    | 275.54       | 601.94    | 508.68                | 835.08    | 288.25        | 915.62    |
| LONG TUBE   | -            | -         | -                     | -         | -             | -         |
| LAT TUBE    | 0            | 452.52    | 25.86                 | 724.02    | 0             | 568.88    |
| COLL TUBE   | 79.90        | 215.11    | 356.47                | 384.12    | 76.82         | 196.67    |
| TR CH 11    | -            | -         | -                     | -         | -             | -         |
| TR BM 11    | -512.88      | 1100.56   | -1292.88              | 1517.27   | -1153.98      | 1549.32   |
| TR CH 21.5  | -689.88      | 659.82    | -1355.81              | 1032.77   | -1808.71      | 1090.14   |
| TR BM 21.5  | 174.75       | 335.27    | 959.03                | 444.43    | 654.95        | 631.56    |
| TR SFT TRQ  | 1307.62      | 662.53    | 383.57                | 871.75    | 714.84        | 2076.76   |
| CG LONG ACC | 0            |           | -.017/-.037           |           | .010          |           |
| CG LAT ACC  | 0            |           | .005/-.038            |           | -.016         |           |
| CG VRT ACC  | 1.000        |           | 1.400/.752            |           | .930/.867     |           |

FLIGHT 14, 9500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |           | POWER TO AUTOROTATION |           | AUTO TO POWER |           |
|-------------|--------------|-----------|-----------------------|-----------|---------------|-----------|
|             | 111.3 KTS    | 320.0 RPM | 112.1 KTS             | 323.0 RPM | 107.4 KTS     | 321.0 RPM |
|             | 52.36 PSI    | -2046 FT  | 21.63 PSI             | -1655 FT  | 14.39 PSI     | -2787 FT  |
|             | -53.39 °F    |           | -53.11 °F             |           | -54.49 °F     |           |
| PARAMETER   | MEAN         | OSC       | MEAN                  | OSC       | MEAN          | OSC       |
| MR CH 192   | -            | -         | -                     | -         | -             | -         |
| MR BM 192   | -3066.27     | 15597.97  | -3199.58              | 14664.76  | -2533.00      | 13664.89  |
| MR CH 150   | -            | -         | -                     | -         | -             | -         |
| MR BM 150   | 2120.8       | 15627.08  | 3292.85               | 12390.04  | 2009.20       | 13394.64  |
| MR BM 35    | 49804.64     | 32711.92  | 28291.39              | 32711.92  | 42437.09      | 21238.41  |
| DRAG BRACE  | 8301.16      | 6135.64   | 9311.74               | 7362.77   | 10827.60      | 10971.97  |
| SCISR LK    | 356.08       | 1254.74   | 385.75                | 1203.88   | 148.36        | 805.41    |
| LONG TUBE   | -            | -         | -                     | -         | -             | -         |
| LAT TUBE    | 271.51       | 1292.90   | 103.43                | 1784.20   | -51.72        | 1486.84   |
| COLL TUBE   | 147.50       | 507.04    | 101.41                | 611.53    | 125.99        | 488.61    |
| TR CH 11    | -            | -         | -                     | -         | -             | -         |
| TR BM 11    | 309.86       | 1891.24   | -512.88               | 1439.32   | -918.91       | 1453.16   |
| TR CH 21.5  | -905.39      | 1749.97   | -1722.64              | 1004.08   | 11589.95      | -1416.62  |
| TR BM 21.5  | -358.66      | 842.08    | 140.35                | 576.98    | 171.53        | 537.99    |
| TR SFT TRQ  | 3608.00      | 1046.10   | 697.40                | 2580.38   | 732.27        | 1813.24   |
| CG LONG ACC | -.087        |           | -.050/-.117           |           | -.080         |           |
| CG LAT ACC  | -.050        |           | .014/-.038            |           | -.002/-.047   |           |
| CG VRT ACC  | .956         |           | 1.248/.797            |           | .949/.867     |           |

FLIGHT 14, 9500-LB., AFT C.G.

| MAX RATE DECELERATION |           | MAX RATE ACCELERATION |           | POWER TO AUTO |           |
|-----------------------|-----------|-----------------------|-----------|---------------|-----------|
| 45.2 KTS              | 323.0 RPM | 41.0 KTS              | 323.0 RPM | 76.4 KTS      | 329.0 RPM |
| 10.74 PSI             | -2274 FT  | 52.36 PSI             | -1503 FT  | 15.02 PSI     | -5405 FT  |
| -53.52 °F             |           | -47.18 °F             |           | -40.60 °F     |           |

| PARAMETER   | MEAN         | OSC      | MEAN         | OSC      | MEAN        | OSC      |
|-------------|--------------|----------|--------------|----------|-------------|----------|
| MR CH 192   | -            | -        | -            | -        | -           | -        |
| MR BM 192   | -3799.51     | 7665.67  | -2732.98     | 9598.75  | -3732.85    | 7865.64  |
| MR CH 150   | -            | -        | -            | -        | -           | -        |
| MR BM 150   | 3627.72      | 5246.23  | 6418.26      | 5971.78  | -390.68     | 9655.30  |
| MR BM 35    | 29175.50     | 33890.73 | 40374.17     | 24460.27 | 21807.95    | 21218.54 |
| DRAG BRACE  | 10322.31     | 14003.70 | 8156.79      | 5413.80  | 10827.60    | 4764.14  |
| SCISR 11    | 241.62       | 877.47   | 216.19       | 996.16   | 436.62      | 614.66   |
| LONG TUBE   | -            | -        | 414.19       | 609.10   | -           | -        |
| LAT TUBE    | 38.79        | 659.38   | 12.93        | 504.23   | -38.79      | 685.24   |
| COLL TUBE   | 233.55       | 405.64   | -15.36       | 233.55   | 396.42      | 202.82   |
| TR CH 11    | -            | -        | -            | -        | -           | -        |
| TR BM 11    | -1442.48     | 1228.78  | -85.48       | 2051.52  | -1292.88    | 1282.20  |
| TR CH 21.5  | -862.00      | 774.58   | -1091.51     | 1520.46  | -2646.77    | 860.64   |
| TR BM 21.5  | 771.90       | 569.18   | -226.11      | 740.72   | 888.86      | 483.41   |
| TR SFT TRQ  | 523.05       | 610.22   | 1359.93      | 714.84   | 557.92      | 2580.38  |
| CG LONG ACC | .063/- .060  |          | .084/- .037  |          | .010/- .060 |          |
| CG LAT ACC  | -.033/- .050 |          | -.026/- .045 |          | .021/- .033 |          |
| CG VRT ACC  | 1.070/.848   |          | 1.051/.949   |          | 1.210/.949  |          |

FLIGHT 14, 9500-LB., AFT C.G.

| STEADY AUTO |           | POWER RECOVERY IGE |           | IGE HOVER |           |
|-------------|-----------|--------------------|-----------|-----------|-----------|
| 63.5 KTS    | 329.0 RPM | 0 KTS              | 321.0 RPM | 0 KTS     | 322.0 RPM |
| 4.90 PSI    | -6283 FT  | 25.91 PSI          | -6165 FT  | 44.74 PSI | -6165 FT  |
| -45.14 °F   |           | -40.0 °F           |           | -40.0 °F  |           |

| PARAMETER   | MEAN         | OSC      | MEAN         | OSC      | MEAN         | OSC      |
|-------------|--------------|----------|--------------|----------|--------------|----------|
| MR CH 192   | -            | -        | -            | -        | -            | -        |
| MR BM 192   | -5066.01     | 6399.17  | -866.55      | 17664.37 | -1799.77     | 3999.48  |
| MR CH 150   | -            | -        | -            | -        | -            | -        |
| MR BM 150   | 837.16       | 6641.51  | 4130.01      | 10213.41 | 3460.28      | 3013.79  |
| MR BM 35    | 26523.18     | 25344.37 | 39784.77     | 38016.56 | 34185.43     | 15619.21 |
| DRAG BRACE  | 11116.34     | 3970.12  | 9095.18      | 12776.57 | 7940.24      | 4186.67  |
| SCISR LK    | 559.55       | 682.48   | 411.18       | 809.65   | 440.86       | 584.98   |
| LONG TUBE   | -            | -        | -            | -        | -            | -        |
| LAT TUBE    | 38.79        | 685.24   | 51.72        | 568.88   | 103.43       | 245.65   |
| COLL TUBE   | 411.78       | 129.07   | 162.87       | 396.42   | 205.89       | 86.04    |
| TR CH 11    | -            | -        | -            | -        | -            | -        |
| TR BM 11    | -1805.76     | 972.34   | -651.78      | 2190.42  | -32.06       | 1175.35  |
| TR CH 21.5  | -2073.01     | 860.64   | -957.62      | 1377.02  | -1354.35     | 688.51   |
| TR BM 21.5  | 974.62       | 421.04   | 124.75       | 436.63   | -116.96      | 483.41   |
| TR SFT TRQ  | 401.00       | 1133.28  | 836.88       | 1534.28  | 1917.85      | 645.10   |
| CG LONG ACC | .007/- .110  |          | .063/- .037  |          | .097/.070    |          |
| CG LAT ACC  | -.007/- .068 |          | -.002/- .078 |          | -.009/- .021 |          |
| CG VRT ACC  | 1.006/.759   |          | .975/.575    |          | 1.038        |          |

FLIGHT 14, 9500-LB., AFT C.G.

IGE HOVER

0 KTS 306.0 RPM  
43.80 PSI -6165 FT  
-40.0 °F

| PARAMETER   | MEAN        | OSC      |
|-------------|-------------|----------|
| MR CH 192   | -           | -        |
| MR BM 192   | -1733.11    | 466.06   |
| MR CH 150   | -           | -        |
| MR BM 150   | 13627.72    | 3069.60  |
| MR BM 35    | 44794.70    | 10314.57 |
| DRAG BRACE  | 7651.50     | 4042.30  |
| SCISR LK    | 356.08      | 504.44   |
| LONG TUBE   | -           | -        |
| LAT TUBE    | 51.72       | 400.80   |
| COLL TUBE   | 89.12       | 104.48   |
| TR CH 11    | -           | -        |
| TR BM 11    | 160.28      | 1335.62  |
| TR CH 21.5  | -1491.73    | 1004.08  |
| TR BM 21.5  | -132.55     | 421.04   |
| TR SFT TRQ  | 1848.11     | 697.40   |
| CG LONG ACC | .097/.067   |          |
| CG LAT ACC  | -.005/-.021 |          |
| CG VRT ACC  | 1.038       |          |

FLIGHT 15, 9500-LB., AFT C.G.

ROTOR START

FLAT PITCH

FLAT PITCH

0 KTS 167.0 RPM 0 KTS 248.0 RPM 0 KTS 326.0 RPM  
10.9 PSI -5598 FT 10.3 PSI -5598 FT 16.6 PSI -5598 FT  
-32.80 °F -32.80 °F -32.80 °F

| PARAMETER   | MEAN        | OSC      | MEAN      | OSC      | MEAN        | OSC     |
|-------------|-------------|----------|-----------|----------|-------------|---------|
| MR CH 192   | -           | -        | -         | -        | -           | -       |
| MR BM 192   | -1447.39    | 8432.62  | -1132.74  | 7488.67  | -440.51     | 5034.40 |
| MR CH 150   | -           | -        | -         | -        | -           | -       |
| MR BM 150   | 1450.44     | 4029.00  | 1987.64   | 4458.76  | 2471.12     | 3115.76 |
| MR BM 35    | -56657.29   | 15943.76 | -58934.97 | 18790.86 | -           | -       |
| DRAG BRACE  | 7145.00     | 2786.55  | 7073.55   | 3572.50  | 10217.35    | 3143.80 |
| SCISR LK    | 365.31      | 424.10   | 419.90    | 478.69   | 512.28      | 398.90  |
| LONG TUBE   | -           | -        | -         | -        | -           | -       |
| LAT TUBE    | 344.25      | 573.75   | 255.00    | 306.00   | 267.75      | 165.75  |
| COLL TUBE   | 263.78      | 90.96    | 248.62    | 139.47   | 397.19      | 136.44  |
| TR CH 11    | 8238.18     | 1028.28  | -39.60    | 981.54   | -1324.23    | 1261.98 |
| TR BM 11    | -31.71      | 1067.57  | -295.96   | 856.17   | -369.95     | 1204.98 |
| TR CH 21.5  | 3803.77     | 841.20   | 79.45     | 1099.56  | -20.51      | 448.64  |
| TR BM 21.5  | 7.54        | 459.94   | 113.10    | 346.84   | 158.34      | 444.86  |
| TR SFT TRQ  | 1024.28     | 1289.18  | 794.70    | 1236.20  | 1377.48     | 741.72  |
| CG LONG ACC | -.032/-.123 |          | -.073     |          | -.063/-.079 |         |
| CG LAT ACC  | .072/-.025  |          | -.002     |          | .009/-.009  |         |
| CG VRT ACC  | 1.054/.946  |          | .994      |          | 1.000       |         |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | IGE HOVER   |           | IGE HOVER   |           | LEFT SIDEWARD FLIGHT |           |
|-------------|-------------|-----------|-------------|-----------|----------------------|-----------|
|             | 0 KTS       | 322.0 RPM | 0 KTS       | 306.0 RPM | 0 KTS                | 321.0 RPM |
|             | 44.6 PSI    | -5598 FT  | 42.6 PSI    | -5598 FT  | 46.1 PSI             | -5598 FT  |
|             | -32.80 °F   |           | -32.80 °F   |           | -32.80 °F            |           |
|             | MEAN        | OSC       | MEAN        | OSC       | MEAN                 | OSC       |
| MR CH 192   | -           | -         | -           | -         | -                    | -         |
| MR BM 192   | -3712.87    | 2643.06   | -3964.59    | 3146.50   | -3587.01             | 5286.12   |
| MR CH 150   | -           | -         | -           | -         | -                    | -         |
| MR BM 150   | 1074.40     | 3115.76   | 966.96      | 2095.08   | 1504.16              | 4834.80   |
| MR BM 35    | 26762.74    | 11673.11  | 35588.75    | 18221.44  | 29040.42             | 9110.72   |
| DRAG BRACE  | 9217.05     | 2929.45   | 9002.70     | 3501.05   | 9288.50              | 2786.55   |
| SCISR LK    | 407.30      | 453.49    | 369.51      | 466.09    | 407.30               | 386.31    |
| LONG TUBE   | -           | -         | -           | -         | -                    | -         |
| LAT TUBE    | 255.00      | 255.00    | 255.00      | 216.75    | 280.50               | 204.00    |
| COLL TUBE   | 206.18      | 100.06    | 1979.90     | 78.83     | 191.02               | 75.80     |
| TR CH 11    | -675.22     | 981.54    | -288.84     | 1051.65   | -2705.20             | 1215.24   |
| TR BM 11    | -1701.77    | 581.35    | 232.54      | 1215.55   | 274.82               | 1300.11   |
| TR CH 21.5  | 2296.35     | 1065.52   | -249.77     | 869.24    | -686.08              | 841.20    |
| TR BM 21.5  | 173.42      | 414.70    | -128.18     | 490.10    | -218.66              | 459.94    |
| TR SFT TRQ  | 2454.74     | 653.42    | 1977.92     | 706.40    | 2083.88              | 600.44    |
| CG LONG ACC | .063/.054   |           | .054        |           | .073/.057            |           |
| CG LAT ACC  | -.034/-.047 |           | -.032/-.045 |           | -.034/-.070          |           |
| CG VRT ACC  | 1.024/1.018 |           | 1.030/.970  |           | 1.018/.994           |           |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | REARWARD FLIGHT |           | JUMP TAKEOFF |           | LEVEL FLIGHT |           |
|-------------|-----------------|-----------|--------------|-----------|--------------|-----------|
|             | 0 KTS           | 324.0 RPM | 0 KTS        | 321.0 RPM | 66.0 KTS     | 322.0 RPM |
|             | 44.5 PSI        | -5598 FT  | 60.1 PSI     | -5598 FT  | 31.4 PSI     | 1425 FT   |
|             | -32.80 °F       |           | -32.80 °F    |           | -28.88 °F    |           |
|             | MEAN            | OSC       | MEAN         | OSC       | MEAN         | OSC       |
| MR CH 192   | -               | -         | -            | -         | -            | -         |
| MR BM 192   | -3712.87        | 4027.52   | -4405.10     | 5160.26   | -5663.70     | 7488.67   |
| MR CH 150   | -               | -         | -            | -         | -            | -         |
| MR BM 150   | 1074.40         | 3008.32   | 1557.88      | 2954.60   | 966.96       | 7574.52   |
| MR BM 35    | 26478.03        | 12811.95  | 41567.66     | 20214.41  | 26478.03     | 20499.12  |
| DRAG BRACE  | 9145.60         | 3501.05   | 7930.95      | 5358.75   | 9931.55      | 5358.75   |
| SCISR LK    | 478.69          | 512.28    | 319.12       | 554.27    | 344.32       | 713.83    |
| LONG TUBE   | -               | -         | -            | -         | -            | -         |
| LAT TUBE    | 255.00          | 357.00    | 216.75       | 410.00    | 165.75       | 446.25    |
| COLL TUBE   | 209.21          | 72.77     | 181.92       | 118.25    | 151.60       | 154.63    |
| TR CH 11    | -823.41         | 1051.65   | -1232.89     | 2009.82   | -324.66      | 1121.76   |
| TR BM 11    | 63.42           | 676.48    | 359.38       | 2452.24   | -454.51      | 1057.00   |
| TR CH 21.5  | -880.50         | 532.76    | -41.16       | 1373.96   | -171.17      | 504.72    |
| TR BM 21.5  | -180.96         | 482.56    | -233.74      | 452.40    | 165.88       | 256.36    |
| TR SFT TRQ  | 2401.76         | 671.08    | 3532.00      | 3002.20   | 1465.78      | 635.76    |
| CG LONG ACC | .085/.038       |           | .196/-.070   |           | 0            |           |
| CG LAT ACC  | -.022/-.054     |           | .038/-.113   |           | 0            |           |
| CG VRT ACC  | 1.018/.994      |           | 1.018/.760   |           | 1.000        |           |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | POWER TO AUTOROTATION |          | STEADY AUTO  |          | AUTO TO POWER |          |
|-------------|-----------------------|----------|--------------|----------|---------------|----------|
|             | MEAN                  | OSC      | MEAN         | OSC      | MEAN          | OSC      |
| MR CH 192   | -                     | -        | -            | -        | -             | -        |
| MR BM 192   | -5537.84              | 8117.97  | -6167.14     | 6230.07  | -5852.49      | 7236.95  |
| MR CH 150   | -                     | -        | -            | -        | -             | -        |
| MR BM 150   | 5425.72               | 7198.48  | -268.60      | 6177.80  | 1396.72       | 7735.68  |
| MR BM 35    | 16797.89              | 21353.25 | 21068.54     | 18790.86 | 29894.55      | 22207.38 |
| DRAG BRACE  | 11860.70              | 4144.10  | 12146.50     | 3143.80  | 9860.10       | 5716.00  |
| SCISR LK    | 386.31                | 600.46   | 512.28       | 818.80   | 335.92        | 785.21   |
| LONG TUBE   | -                     | -        | -            | -        | -             | -        |
| LAT TUBE    | 178.50                | 484.50   | 178.50       | 599.25   | 102.00        | 484.50   |
| COLL TUBE   | -257.72               | 209.21   | 360.81       | 257.72   | 160.70        | 178.89   |
| TR CH 11    | -898.28               | 1402.20  | -759.21      | 958.17   | -348.04       | 1191.87  |
| TR BM 11    | -1226.12              | 1363.53  | -1405.81     | 1426.95  | -782.18       | 1257.83  |
| TR CH 21.5  | -1403.75              | 1177.68  | -586.55      | 953.36   | -367.45       | 672.96   |
| TR BM 21.5  | 648.44                | 467.48   | 814.32       | 527.80   | 399.62        | 324.22   |
| TR SFT TRQ  | 441.50                | 2684.32  | 406.18       | 706.40   | -476.82       | 794.70   |
| CG LONG ACC | .003/- .038           |          | -.022/- .041 |          | .019/- .016   |          |
| CG LAT ACC  | .036/- .002           |          | .004/- .018  |          | .016/- .007   |          |
| CG VRT ACC  | 1.240/1.000           |          | 1.030/.778   |          | .994/.808     |          |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |          | POWER TO AUTOROTATION |          | STEADY AUTO  |          |
|-------------|--------------|----------|-----------------------|----------|--------------|----------|
|             | MEAN         | OSC      | MEAN                  | OSC      | MEAN         | OSC      |
| MR CH 192   | -            | -        | -                     | -        | -            | -        |
| MR BM 192   | -5663.70     | 16235.94 | -4719.75              | 11453.26 | -5286.12     | 8558.48  |
| MR CH 150   | -            | -        | -                     | -        | -            | -        |
| MR BM 150   | 107.44       | 13161.40 | 161.16                | 10153.08 | -1074.40     | 9024.96  |
| MR BM 35    | 30179.26     | 29325.13 | 0                     | 18770.86 | 19644.99     | 16797.89 |
| DRAG BRACE  | 8145.30      | 5858.90  | 10360.25              | 6359.05  | 11332.15     | 4358.45  |
| SCISR LK    | 268.74       | 898.59   | 461.89                | 722.23   | 499.68       | 776.82   |
| LONG TUBE   | -            | -        | -                     | -        | -            | -        |
| LAT TUBE    | 204.00       | 930.75   | 204.00                | 1236.75  | 51.00        | 573.75   |
| COLL TUBE   | 48.51        | 278.94   | 333.52                | 357.78   | 324.42       | 312.30   |
| TR CH 11    | -690.52      | 1635.90  | -52.20                | 1706.01  | -2698.92     | 1425.57  |
| TR BM 11    | 274.82       | 1500.94  | -1648.92              | 1426.95  | -1511.51     | 1236.69  |
| TR CH 21.5  | -286.57      | 813.16   | -712.26               | 813.16   | -1820.31     | 729.04   |
| TR BM 21.5  | -226.20      | 535.34   | 980.20                | 625.82   | 874.64       | 527.80   |
| TR SFT TRQ  | 1995.58      | 688.74   | 653.42                | 1995.58  | 406.18       | 1695.36  |
| CG LONG ACC | -.060        |          | -.095/- .073          |          | -.050/- .066 |          |
| CG LAT ACC  | .009         |          | .043/.034             |          | .036/.022    |          |
| CG VRT ACC  | 1.000        |          | 1.216/.946            |          | 1.060/.940   |          |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | AUTO TO POWER                    |                     | MAX RATE DECELERATION             |                      | MAX RATE ACCELERATION             |                      |
|-------------|----------------------------------|---------------------|-----------------------------------|----------------------|-----------------------------------|----------------------|
|             | 97.9 KTS<br>5.1 PSI<br>-31.12 °F | 327.0 RPM<br>800 FT | 49.2 KTS<br>16.8 PSI<br>-28.05 °F | 323.0 RPM<br>1495 FT | 12.0 KTS<br>45.5 PSI<br>-17.24 °F | 323.0 RPM<br>2468 FT |
|             | MEAN                             | OSC                 | MEAN                              | OSC                  | MEAN                              | OSC                  |
| MR CH 192   | -                                | -                   | -                                 | -                    | -                                 | -                    |
| MR BM 192   | -6418.86                         | 13089.44            | -5663.70                          | 8055.04              | -5097.33                          | 9250.71              |
| MR CH 150   | -                                | -                   | -                                 | -                    | -                                 | -                    |
| MR BM 150   | 5210.84                          | 11334.92            | 4995.96                           | 8541.48              | 805.80                            | 9401.00              |
| MR BM 35    | 33880.49                         | 23061.51            | 19360.28                          | 19075.57             | 23346.22                          | 21068.54             |
| DRAG BRACE  | 9931.55                          | 6859.20             | 10860.40                          | 4144.10              | 8145.30                           | 4215.55              |
| SCISR LK    | 310.73                           | 893.80              | 386.31                            | 596.26               | 239.34                            | 772.62               |
| LONG TUBE   | -                                | -                   | -                                 | -                    | -                                 | -                    |
| LAT TUBE    | 229.50                           | 930.75              | 76.50                             | 510.00               | 140.25                            | 446.25               |
| COLL TUBE   | 233.46                           | 418.42              | 215.27                            | 281.98               | 15.16                             | 166.76               |
| TR CH 11    | -2895.82                         | 1121.76             | 209.12                            | 1635.90              | -936.01                           | 1519.05              |
| TR BM 11    | -1416.38                         | 1500.94             | -845.60                           | 1976.59              | 264.25                            | 1902.60              |
| TR CH 21.5  | -1974.26                         | 813.16              | -77.08                            | 560.80               | -441.60                           | 1261.80              |
| TR BM 21.5  | 784.16                           | 520.26              | 444.86                            | 557.96               | -211.12                           | 731.38               |
| TR SFT TRQ  | 671.08                           | 1836.64             | 741.72                            | 918.32               | 2419.42                           | 812.36               |
| CG LONG ACC | .032/- .111                      |                     | .054/- .060                       |                      | .180/- .025                       |                      |
| CG LAT ACC  | .077/- .070                      |                     | .070/- .038                       |                      | .014/- .032                       |                      |
| CG VRT ACC  | 1.024/.700                       |                     | 1.090/.904                        |                      | 1.108/.850                        |                      |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | POWER TO AUTO                     |                       | STEADY AUTO                      |                       | AUTO TO POWER                     |                       |
|-------------|-----------------------------------|-----------------------|----------------------------------|-----------------------|-----------------------------------|-----------------------|
|             | 99.9 KTS<br>14.8 PSI<br>-34.90 °F | 325.0 RPM<br>-3986 FT | 81.9 KTS<br>3.4 PSI<br>-40.65 °F | 329.0 RPM<br>-5509 FT | 38.8 KTS<br>22.0 PSI<br>-32.80 °F | 320.0 RPM<br>-5598 FT |
|             | MEAN                              | OSC                   | MEAN                             | OSC                   | MEAN                              | OSC                   |
| MR CH 192   | -                                 | -                     | -                                | -                     | -                                 | -                     |
| MR BM 192   | -5537.80                          | 11390.33              | -7299.88                         | 7740.39               | -6544.72                          | 10068.80              |
| MR CH 150   | -                                 | -                     | -                                | -                     | -                                 | -                     |
| MR BM 150   | -1343.00                          | 8702.64               | -2686.00                         | 8272.88               | 805.80                            | 6929.88               |
| MR BM 35    | 15659.05                          | 20783.83              | 18221.44                         | 24200.35              | 35588.75                          | 27332.16              |
| DRAG BRACE  | 10431.70                          | 5430.20               | 12146.50                         | 4358.45               | 9574.20                           | 7359.35               |
| SCISR LK    | 512.28                            | 562.7                 | 583.66                           | 608.86                | 432.50                            | 797.81                |
| LONG TUBE   | -                                 | -                     | -                                | -                     | -                                 | -                     |
| LAT TUBE    | 242.25                            | 688.50                | 242.25                           | 624.75                | 229.50                            | 714.00                |
| COLL TUBE   | 275.91                            | 239.53                | 497.25                           | 257.72                | 200.11                            | 230.43                |
| TR CH 11    | -4123.34                          | 1261.98               | -1366.56                         | 1261.98               | -1066.61                          | 1869.60               |
| TR BM 11    | -1796.90                          | 1331.82               | -1701.77                         | 1162.70               | -211.40                           | 1574.93               |
| TR CH 21.5  | -1796.31                          | 813.16                | -50.14                           | 869.24                | 453.13                            | 1093.56               |
| TR BM 21.5  | 859.56                            | 490.10                | 836.94                           | 505.18                | -67.86                            | 482.56                |
| TR SFT TRQ  | 512.14                            | 3832.22               | 494.48                           | 1554.08               | 1554.08                           | 1130.24               |
| CG LONG ACC | -.041/- .126                      |                       | .013/- .054                      |                       | .060/- .082                       |                       |
| CG LAT ACC  | .016/- .081                       |                       | -.020/- .047                     |                       | -.029/- .072                      |                       |
| CG VRT ACC  | 1.486/.838                        |                       | 1.060/.826                       |                       | .892/.730                         |                       |

FLIGHT 15, 9500-LB., AFT C.G.

| PARAMETER   | IGE HOVER                      |                       | IGE HOVER                      |                       |
|-------------|--------------------------------|-----------------------|--------------------------------|-----------------------|
|             | 0 KTS<br>43.1 PSI<br>-32.80 °F | 322.0 RPM<br>-5598 FT | 0 KTS<br>42.0 PSI<br>-32.80 °F | 306.0 RPM<br>-5598 FT |
| PARAMETER   | MEAN                           | OSC                   | MEAN                           | OSC                   |
| MR CH 192   | -                              | -                     | -                              | -                     |
| MR BM 192   | -3649.94                       | 2705.99               | -3964.59                       | 4971.47               |
| MR CH 150   | -                              | -                     | -                              | -                     |
| MR BM 150   | 913.24                         | 2417.40               | 913.24                         | 4082.72               |
| MR BM 35    | 21922.67                       | 8541.30               | 433026.36                      | 7971.88               |
| DRAG BRACE  | 8788.35                        | 2858.00               | 8073.85                        | 2500.75               |
| SCISR LK    | 361.11                         | 403.10                | 293.93                         | 369.51                |
| LONG TUBE   | -                              | -                     | -                              | -                     |
| LAT TUBE    | 191.25                         | 369.75                | 178.50                         | 191.25                |
| COLL TUBE   | 227.40                         | 84.90                 | 166.76                         | 69.74                 |
| TR CH 11    | -838.80                        | 88.06                 | -662.76                        | 911.43                |
| TR BM 11    | 105.70                         | 1004.15               | 221.97                         | 856.17                |
| TR CH 21.5  | -731.97                        | 560.80                | -838.61                        | 813.16                |
| TR BM 21.5  | -67.86                         | 377.00                | -128.18                        | 369.46                |
| TR SFT TRQ  | 2083.88                        | 812.36                | 1995.58                        | 635.76                |
| CG LONG ACC | .054/.022                      |                       | .054/.044                      |                       |
| CG LAT ACC  | -.036/-.050                    |                       | -.038/-.059                    |                       |
| CG VRT ACC  | 1.012/.952                     |                       | 1.013/.976                     |                       |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | FLAT PITCH                     |                        | FLAT PITCH                      |                        | FLAT PITCH                      |                        |
|-------------|--------------------------------|------------------------|---------------------------------|------------------------|---------------------------------|------------------------|
|             | 0 KTS<br>7.58 PSI<br>-38.20 °F | 248.22 RPM<br>-6050 FT | 0 KTS<br>11.70 PSI<br>-38.20 °F | 308.40 RPM<br>-6050 FT | 0 KTS<br>12.08 PSI<br>-38.20 °F | 309.72 RPM<br>-6050 FT |
| PARAMETER   | MEAN                           | OSC                    | MEAN                            | OSC                    | MEAN                            | OSC                    |
| MR CH 192   | -                              | -                      | -                               | -                      | -                               | -                      |
| MR BM 192   | 64.10                          | 7435.60                | 256.40                          | 3846.00                | 192.30                          | 4807.50                |
| MR CH 150   | -                              | -                      | -                               | -                      | -                               | -                      |
| MR BM 150   | -382.20                        | 4040.40                | 546.00                          | 3057.60                | 709.80                          | 2784.60                |
| MR BM 35    | -76873.70                      | 16997.20               | -                               | -                      | -                               | -                      |
| DRAG BRACE  | 4787.15                        | 2429.30                | 6930.65                         | 2286.40                | 7216.45                         | 2429.30                |
| SCISR LK    | 259.92                         | 451.44                 | 328.32                          | 387.60                 | 342.00                          | 383.04                 |
| LONG TUBE   | 269.43                         | 320.75                 | 397.73                          | 218.11                 | 295.09                          | 192.45                 |
| LAT TUBE    | 351.68                         | 439.60                 | 326.56                          | 125.60                 | 339.12                          | 188.40                 |
| COLL TUBE   | 217.26                         | 107.10                 | 321.30                          | 146.88                 | 336.60                          | 153.00                 |
| TR CH 11    | -46.36                         | 882.00                 | 6468.04                         | 1033.20                | 6683.56                         | 1008.00                |
| TR BM 11    | -454.00                        | 1026.00                | -453.60                         | 1134.00                | -399.60                         | 1166.00                |
| TR CH 21.5  | 3156.23                        | 1176.00                | 7672.10                         | 705.60                 | 7574.30                         | 588.00                 |
| TR BM 21.5  | 85.00                          | 347.00                 | 23.10                           | 400.00                 | 69.00                           | 385.00                 |
| TR SFT TRQ  | 823.40                         | 1432.00                | 1449.90                         | 626.50                 | 1396.20                         | 519.10                 |
| CG LONG ACC | .087/.051                      |                        | .080/.060                       |                        | .069                            |                        |
| CG LAT ACC  | .065/.035                      |                        | .072/.048                       |                        | .077/.043                       |                        |
| CG VRT ACC  | 1.149/1.096                    |                        | 1.132                           |                        | 1.108                           |                        |



FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | FLAT PITCH |            | IGE HOVER |            | IGE HOVER |            |
|-------------|------------|------------|-----------|------------|-----------|------------|
|             | 0 KTS      | 325.23 RPM | 0 KTS     | 323.00 RPM | 0 KTS     | 307.75 RPM |
|             | 13.05 PSI  | -6050 FT   | 34.58 PSI | -6050 FT   | 33.22 PSI | -6050 FT   |
|             | -38.20 °F  |            | -38.20 °F |            | -38.20 °F |            |
|             | MEAN       | OSC        | MEAN      | OSC        | MEAN      | OSC        |
| MR CH 192   | -          | -          | -         | -          | -         | -          |
| MR BM 192   | 705.10     | 3205.00    | -2435.80  | 3717.80    | -2948.60  | 3525.50    |
| MR CH 150   | -          | -          | -         | -          | -         | -          |
| MR BM 150   | 491.40     | 3003.00    | -873.60   | 2347.80    | -655.20   | 2293.20    |
| MR BM 35    | -          | -          | 28972.50  | 12361.60   | 40175.20  | 11589.00   |
| DRAG BRACE  | 8073.85    | 2572.20    | 6716.30   | 2143.50    | 5430.20   | 2286.40    |
| SCISR LK    | 369.36     | 410.40     | 237.12    | 383.04     | 209.76    | 456.00     |
| LONG TUBE   | 320.75     | 333.58     | 282.26    | 243.77     | 307.92    | 256.60     |
| LAT TUBE    | 351.68     | 188.40     | 301.44    | 251.0      | 314.00    | 238.64     |
| COLL TUBE   | 373.32     | 171.36     | 134.64    | 76.50      | 107.10    | 64.26      |
| TR CH 11    | 8081.04    | 1260.00    | 8190.33   | 958.00     | 6825.92   | 1008.00    |
| TR BM 11    | -454.00    | 1382.00    | 32.00     | 1026.00    | 194.40    | 972.00     |
| TR CH 21.5  | 7987.69    | 588.00     | 7740.09   | 853.00     | 7353.41   | 588.00     |
| TR BM 21.5  | 69.00      | 408.00     | -162.00   | 308.00     | -239.00   | 462.00     |
| TR SFT TRQ  | 1419.90    | 680.20     | 2255.40   | 626.50     | 2309.10   | 554.90     |
| CG LONG ACC | .069       |            | .173/.158 |            | .174/.144 |            |
| CG LAT ACC  | .066/.042  |            | .020      |            | .037/.003 |            |
| CG VRT ACC  | 1.120      |            | 1.120     |            | 1.120     |            |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | LEFT HOVERING TURN |            | RIGHT HOVERING TURN |            | VERTICAL TAKEOFF |            |
|-------------|--------------------|------------|---------------------|------------|------------------|------------|
|             | 0 KTS              | 321.91 RPM | 0 KTS               | 324.86 RPM | 0 KTS            | 321.93 RPM |
|             | 35.78 PSI          | -6050 FT   | 35.48 PSI           | -6050 FT   | 45.08 PSI        | -6050 FT   |
|             | -38.20 °F          |            | -38.20 °F           |            | -38.20 °F        |            |
|             | MEAN               | OSC        | MEAN                | OSC        | MEAN             | OSC        |
| MR CH 192   | -                  | -          | -                   | -          | -                | -          |
| MR BM 192   | -2307.60           | 4935.70    | -2564.00            | 3012.70    | -2628.10         | 6602.30    |
| MR CH 150   | -                  | -          | -                   | -          | -                | -          |
| MR BM 150   | -163.80            | 3494.40    | -382.20             | 2730.00    | 273.00           | 4368.00    |
| MR BM 35    | 30131.40           | 13520.50   | 31676.60            | 11589.00   | 43651.90         | 19315.00   |
| DRAG BRACE  | 6930.65            | 2072.05    | 6716.30             | 2143.50    | 6073.25          | 3643.95    |
| SCISR LK    | 250.80             | 460.56     | 214.32              | 433.20     | 182.40           | 679.44     |
| LONG TUBE   | 256.60             | 205.28     | 295.09              | 256.60     | 513.20           | 872.44     |
| LAT TUBE    | 301.44             | 314.00     | 251.20              | 301.44     | 263.76           | 477.28     |
| COLL TUBE   | 174.42             | 76.50      | 146.88              | 107.10     | 107.10           | 91.80      |
| TR CH 11    | 8117.47            | 1134.00    | 7847.23             | 1260.00    | 7032.90          | 1789.20    |
| TR BM 11    | 226.80             | 1274.40    | -183.60             | 1447.20    | 885.60           | 1771.20    |
| TR CH 21.5  | 7689.56            | 882.00     | 7402.52             | 852.60     | 8630.21          | 1323.00    |
| TR BM 21.5  | -316.00            | 385.00     | -231.00             | 562.10     | -15.40           | 477.40     |
| TR SFT TRQ  | 2792.40            | 626.50     | 1879.50             | 877.10     | 3275.70          | 698.10     |
| CG LONG ACC | .165               |            | .194/.161           |            | .219/.060        |            |
| CG LAT ACC  | .010               |            | .022/.002           |            | .050/.020        |            |
| CG VRT ACC  | 1.120              |            | 1.120               |            | 1.168/1.018      |            |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | HOVER TO FULL POWER CLIMB |            | FULL POWER CLIMB |            | LEVEL FLIGHT |            |
|-------------|---------------------------|------------|------------------|------------|--------------|------------|
|             | 0 KTS                     | 320.49 RPM | 0 KTS            | 320.11 RPM | 65.5 KTS     | 323.50 RPM |
|             | 49.95 PSI                 | -6050 FT   | 49.72 PSI        | -6050 FT   | 23.32 PSI    | - 473 FT   |
|             | -38.20 °F                 |            | -38.20 °F        |            | -23.38 °F    |            |
|             | MEAN                      | OSC        | MEAN             | OSC        | MEAN         | OSC        |
| MR CH 192   | -                         | -          | -                | -          | -            | -          |
| MR BM 192   | -2371.70                  | 5192.10    | -4871.60         | 9615.00    | -3569.60     | 7820.20    |
| MR CH 150   | -                         | -          | -                | -          | -            | -          |
| MR BM 150   | 600.60                    | 4095.00    | -764.40          | 9063.60    | -1255.80     | 7098.00    |
| MR BM 35    | 55240.90                  | 20087.60   | 43651.90         | 21246.50   | 30131.40     | 22405.40   |
| DRAG BRACE  | 5573.10                   | 3643.95    | 5144.40          | 4287.00    | 8717.00      | 4144.00    |
| SCISR LK    | 214.32                    | 684.00     | 123.12           | 779.76     | 214.32       | 706.80     |
| LONG TUBE   | 384.90                    | 551.69     | 551.69           | 744.14     | 461.88       | 552.00     |
| LAT TUBE    | 226.08                    | 464.72     | 226.08           | 540.08     | 301.44       | 452.00     |
| COLL TUBE   | 122.40                    | 107.10     | 30.60            | 156.06     | 137.70       | 153.00     |
| TR CH 11    | 7556.43                   | 2343.60    | 7978.04          | 1890.00    | 8241.49      | 1235.00    |
| TR BM 11    | 410.40                    | 2106.00    | 205.20           | 1879.20    | -766.80      | 1252.80    |
| TR CH 21.5  | 7288.68                   | 1323.00    | 7026.95          | 1058.40    | 6794.69      | 882.00     |
| TR BM 21.5  | -546.70                   | 492.80     | -539.00          | 562.10     | 223.00       | 308.00     |
| TR SFT TRQ  | 3204.10                   | 608.60     | 2076.40          | 608.60     | 1002.40      | 376.00     |
| CG LONG ACC | .225/.150                 |            | .186/.120        |            | .111/.057    |            |
| CG LAT ACC  | .036/.014                 |            | .048/.022        |            | .035/-.003   |            |
| CG VRT ACC  | 1.132/1.042               |            | 1.150/1.084      |            | 1.063/1.033  |            |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |           | LEFT TURN   |           | RIGHT TURN |           |
|-------------|--------------|-----------|-------------|-----------|------------|-----------|
|             | 80.5 KTS     | 324.0 RPM | 79.7 KTS    | 323.6 RPM | 79.7 KTS   | 320.4 RPM |
|             | 25.72 PSI    | - 372 FT  | 27.00 PSI   | - 341 FT  | 27.45 PSI  | - 317 FT  |
|             | -22.83 °F    |           | -22.42 °F   |           | -22.15 °F  |           |
|             | MEAN         | OSC       | MEAN        | OSC       | MEAN       | OSC       |
| MR CH 192   | -            | -         | -           | -         | -          | -         |
| MR BM 192   | -4230.60     | 9615.00   | -4679.30    | 9294.50   | -4743.40   | 9294.50   |
| MR CH 150   | -            | -         | -           | -         | -          | -         |
| MR BM 150   | -1474.20     | 8736.00   | -873.60     | 8627.00   | -764.40    | 8572.00   |
| MR BM 35    | 33994.40     | 24336.90  | 39402.60    | 23950.60  | 53309.40   | 22019.10  |
| DRAG BRACE  | 8145.30      | 4216.00   | 8145.00     | 4716.00   | 10860.00   | 4878.00   |
| SCISR LK    | 191.52       | 720.48    | 191.52      | 756.96    | 200.64     | 761.52    |
| LONG TUBE   | 487.54       | 616.00    | 487.54      | 641.50    | 551.69     | 642.00    |
| LAT TUBE    | 326.56       | 490.00    | 288.88      | 376.80    | 401.92     | 440.00    |
| COLL TUBE   | 122.40       | 187.00    | 107.10      | 205.02    | 122.40     | 214.00    |
| TR CH 11    | 8065.81      | 1512.00   | 8110.60     | 1713.60   | 8266.39    | 1688.40   |
| TR BM 11    | -616.00      | 1350.00   | -583.20     | 1469.00   | -562.00    | 1458.00   |
| TR CH 21.5  | 8349.88      | 647.00    | 8352.93     | 126.60    | 8671.16    | 735.00    |
| TR BM 21.5  | 115.50       | 308.00    | 7.7         | 370.00    | 92.40      | 308.00    |
| TR SFT TRQ  | 1056.10      | 644.00    | 1091.90     | 573.00    | 1127.70    | 716.00    |
| CG LONG ACC | .081/.027    |           | .098/.041   |           | .035/-.019 |           |
| CG LAT ACC  | .035/-.015   |           | .039/-.019  |           | .040/-.020 |           |
| CG VRT ACC  | 1.057/1.027  |           | 1.033/1.003 |           | 1.000      |           |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | S-TURN                             |                       | CYCLIC PULL-UP                     |                        | COLLECTIVE PULL-UP                 |                        |
|-------------|------------------------------------|-----------------------|------------------------------------|------------------------|------------------------------------|------------------------|
|             | 84.0 KTS<br>24.68 PSI<br>-19.40 °F | 323.7 RPM<br>- 107 FT | 76.1 KTS<br>26.40 PSI<br>-22.15 °F | 290.56 RPM<br>- 210 FT | 75.0 KTS<br>39.45 PSI<br>-22.02 °F | 321.91 RPM<br>- 296 FT |
|             | MEAN                               | OSC                   | MEAN                               | OSC                    | MEAN                               | OSC                    |
| MR CH 192   | -                                  | -                     | -                                  | -                      | -                                  | -                      |
| MR BM 192   | 4679.30                            | 7563.80               | -5192.10                           | 9999.60                | -4294.70                           | 9935.30                |
| MR CH 150   | -                                  | -                     | -                                  | -                      | -                                  | -                      |
| MR BM 150   | 928.20                             | 9828.00               | -1255.80                           | 8408.40                | -873.60                            | 8899.80                |
| MR BM 35    | 44810.80                           | 27813.60              | 47128.60                           | 25109.50               | 55627.20                           | 25109.50               |
| DRAG BRACE  | 7930.95                            | 5001.50               | 8574.00                            | 4572.80                | 7073.55                            | 5287.30                |
| SCISR LK    | 127.68                             | 747.84                | 259.92                             | 720.48                 | 177.84                             | 802.56                 |
| LONG TUBE   | 410.56                             | 769.80                | 423.39                             | 590.18                 | 461.88                             | 705.65                 |
| LAT TUBE    | 175.84                             | 439.60                | 226.08                             | 401.92                 | 226.08                             | 464.72                 |
| COLL TUBE   | 91.80                              | 275.40                | 70.38                              | 272.34                 | 9.18                               | 226.44                 |
| TR CH 11    | 8181.30                            | 1108.80               | 9619.46                            | 1713.60                | 7260.67                            | 1562.40                |
| TR BM 11    | 561.60                             | 1144.80               | -561.60                            | 1436.40                | 54.00                              | 1771.20                |
| TR CH 21.5  | 8410.97                            | 529.20                | 8679.76                            | 617.40                 | 8101.16                            | 1234.80                |
| TR BM 21.5  | 84.7                               | 423.5                 | 123.20                             | 423.50                 | -331.10                            | 500.50                 |
| TR SFT TRQ  | 1306.7                             | 662.3                 | 1056.10                            | 662.30                 | 751.80                             | 769.70                 |
| CG LONG ACC | .099                               |                       | .156/.051                          |                        | .108/.069                          |                        |
| CG LAT ACC  | .052                               |                       | .028/.012                          |                        | .006/0                             |                        |
| CG VRT ACC  | 1.174/1.054                        |                       | 1.234/.928                         |                        | 1.210/.934                         |                        |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | LEFT SIDESLIP                      |                       | RIGHT SIDESLIP                     |                       | LEVEL FLIGHT                       |                       |
|-------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|
|             | 78.5 KTS<br>25.58 PSI<br>-24.19 °F | 323.0 RPM<br>- 469 FT | 78.0 KTS<br>26.18 PSI<br>-24.19 °F | 323.3 RPM<br>- 469 FT | 92.4 KTS<br>29.48 PSI<br>-23.78 °F | 318.0 RPM<br>- 330 FT |
|             | MEAN                               | OSC                   | MEAN                               | OSC                   | MEAN                               | OSC                   |
| MR CH 192   | -                                  | -                     | -                                  | -                     | -                                  | -                     |
| MR BM 192   | -3846.00                           | 8974.00               | -3974.20                           | 8012.50               | -5192.10                           | 10191.90              |
| MR CH 150   | -                                  | -                     | -                                  | -                     | -                                  | -                     |
| MR BM 150   | -491.40                            | 8463.00               | -1146.60                           | 7917.00               | -1310.40                           | 9282.00               |
| MR BM 35    | 28972.50                           | 21246.50              | 31290.30                           | 24336.90              | 32062.90                           | 23950.60              |
| DRAG BRACE  | 8002.00                            | 4287.00               | 8503.00                            | 4644.00               | 7287.90                            | 4001.20               |
| SCISR LK    | 246.24                             | 770.64                | 200.64                             | 670.32                | 191.52                             | 747.84                |
| LONG TUBE   | 513.20                             | 603.00                | 436.22                             | 603.00                | 346.41                             | 692.82                |
| LAT TUBE    | 226.08                             | 465.00                | 188.40                             | 528.00                | 238.64                             | 440.00                |
| COLL TUBE   | 100.98                             | 168.00                | 119.34                             | 159.00                | 76.50                              | 214.00                |
| TR CH 11    | 7887.93                            | 1310.00               | 8049.67                            | 958.00                | 8054.62                            | 1310.00               |
| TR BM 11    | -723.60                            | 1080.00               | -291.60                            | 1134.00               | -496.80                            | 1004.00               |
| TR CH 21.5  | 7710.69                            | 676.00                | 8855.01                            | 588.00                | 8395.18                            | 735.00                |
| TR BM 21.5  | 107.80                             | 293.00                | 31.00                              | 347.00                | 8.00                               | 370.00                |
| TR SFT TRQ  | 751.80                             | 787.60                | 1807.90                            | 626.50                | 1449.90                            | 572.80                |
| CG LONG ACC | .113/.068                          |                       | .087/.036                          |                       | .068/.023                          |                       |
| CG LAT ACC  | .007/-0.039                        |                       | .064/.024                          |                       | .058/.002                          |                       |
| CG VRT ACC  | 1.060                              |                       | 1.075/1.045.                       |                       | 1.063/1.033                        |                       |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |          | LEVEL FLIGHT |          | LEFT TURN   |          |
|-------------|--------------|----------|--------------|----------|-------------|----------|
|             | MEAN         | OSC      | MEAN         | OSC      | MEAN        | OSC      |
| MR CH 192   | -            | -        | -            | -        | -           | -        |
| MR BM 192   | -4551.10     | 10897.00 | -4102.40     | 13781.50 | -4807.50    | 14871.20 |
| MR CH 150   | -            | -        | -            | -        | -           | -        |
| MR BM 150   | -1201.20     | 10537.80 | -2347.80     | 12940.00 | -1692.60    | 12940.00 |
| MR BM 35    | 32062.90     | 25109.50 | 33994.40     | 34767.00 | 43265.60    | 36698.50 |
| DRAG BRACE  | 6931.00      | 5001.00  | 6287.60      | 5144.00  | 6002.00     | 5502.00  |
| SCISR LK    | 182.40       | 674.88   | 141.36       | 957.60   | 155.04      | 898.32   |
| LONG TUBE   | 474.71       | 795.00   | 461.88       | 834.00   | 513.20      | 872.44   |
| LAT TUBE    | 213.52       | 691.00   | 238.64       | 1005.00  | 226.08      | 942.00   |
| COLL TUBE   | 21.42        | 196.00   | 21.42        | 358.00   | 12.24       | 352.00   |
| TR CH 11    | 8045.01      | 1260.00  | 7172.62      | 1864.80  | 7122.22     | 1512.00  |
| TR BM 11    | 183.60       | 1199.00  | 86.00        | 1404.00  | 86.00       | 1890.00  |
| TR CH 21.5  | 8217.28      | 970.00   | 7777.78      | 1323.00  | 8218.78     | 1087.80  |
| TR BM 21.5  | -200.20      | 462.00   | -377.30      | 554.00   | -316.00     | 601.00   |
| TR SFT TRQ  | 1646.80      | 680.20   | 1503.60      | 895.00   | 1539.40     | 770.00   |
| CG LONG ACC | .060/- .006  |          | .048/- .042  |          | .051/- .033 |          |
| CG LAT ACC  | .062/- .002  |          | .024/- .060  |          | .045/- .045 |          |
| CG VRT ACC  | 1.120/1.060  |          | 1.075/.985   |          | 1.045/.955  |          |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | RIGHT TURN  |          | S-TURN      |          | CYCLIC PULL-UP |          |
|-------------|-------------|----------|-------------|----------|----------------|----------|
|             | MEAN        | OSC      | MEAN        | OSC      | MEAN           | OSC      |
| MR CH 192   | -           | -        | -           | -        | -              | -        |
| MR BM 192   | -4294.70    | 12691.80 | 4615.20     | 14999.40 | -5769.00       | 16025.00 |
| MR CH 150   | -           | -        | -           | -        | -              | -        |
| MR BM 150   | -2620.80    | 12558.00 | 2730.00     | 13431.60 | -1419.60       | 13595.40 |
| MR BM 35    | 34380.70    | 32835.50 | 42879.30    | 42493.00 | 47901.20       | 36312.20 |
| DRAG BRACE  | 5858.90     | 5002.00  | 6716.30     | 6359.05  | 8645.45        | 10217.35 |
| SCISR LK    | 155.04      | 875.52   | 168.72      | 971.28   | 141.36         | 1048.80  |
| LONG TUBE   | 513.20      | 808.29   | 513.20      | 949.42   | 628.67         | 962.25   |
| LAT TUBE    | 213.52      | 942.00   | 213.52      | 1180.64  | 276.32         | 778.72   |
| COLL TUBE   | -15.30      | 275.00   | 67.32       | 624.24   | 36.72          | 354.96   |
| TR CH 11    | 7424.62     | 1638.00  | 7624.27     | 1360.80  | 7054.79        | 2016.00  |
| TR BM 11    | -64.80      | 1782.00  | 97.20       | 1717.20  | 43.20          | 1414.80  |
| TR CH 21.5  | 8659.78     | 823.00   | 8232.20     | 3057.60  | 8104.41        | 1470.00  |
| TR BM 21.5  | -308.00     | 524.00   | 84.70       | 800.80   | -338.80        | 931.70   |
| TR SFT TRQ  | 1575.20     | 806.00   | 1736.30     | 984.50   | 1324.60        | 966.60   |
| CG LONG ACC | .042/- .024 |          | .036/.024   |          | .036/- .012    |          |
| CG LAT ACC  | .060/- .006 |          | .048        |          | .038/- .018    |          |
| CG VRT ACC  | 1.091/1.030 |          | 1.132/1.048 |          | 1.168/.802     |          |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | COLLECTIVE PULL-UP |          | LEVEL FLIGHT |          | PARTIAL POWER DESCENT |          |
|-------------|--------------------|----------|--------------|----------|-----------------------|----------|
|             | MEAN               | OSC      | MEAN         | OSC      | MEAN                  | OSC      |
| MR CH 192   | -                  | -        | -            | -        | -                     | -        |
| MR BM 192   | -4999.80           | 13653.30 | -4358.80     | 15896.80 | -4358.80              | 6730.50  |
| MR CH 150   | -                  | -        | -            | -        | -                     | -        |
| MR BM 150   | -2238.60           | 13704.60 | -1365.00     | 14414.40 | -1911.00              | 6497.40  |
| MR BM 35    | 45583.40           | 41334.10 | 35153.30     | 42879.30 | 27813.60              | 23178.00 |
| DRAG BRACE  | 5501.65            | 4858.60  | 5358.75      | 6216.15  | 8359.65               | 3501.05  |
| SCISR LK    | 109.44             | 930.24   | 123.12       | 1199.28  | 241.68                | 647.52   |
| LONG TUBE   | 551.69             | 869.61   | 641.50       | 924.00   | 256.60                | 436.22   |
| LAT TUBE    | 314.00             | 879.20   | 200.96       | 1168.08  | 200.96                | 439.60   |
| COLL TUBE   | -30.60             | 351.90   | 12.24        | 786.42   | 189.72                | 128.52   |
| TR CH 11    | 7097.00            | 3780.00  | 6923.83      | 2772.00  | 8011.98               | 1714.00  |
| TR BM 11    | 388.80             | 2570.40  | 464.40       | 2290.00  | -993.60               | 1404.00  |
| TR CH 21.5  | 8526.50            | 1470.00  | 8005.64      | 1881.60  | 8114.15               | 1323.00  |
| TR BM 21.5  | -562.10            | 770.00   | -508.20      | 809.00   | 416.00                | 385.00   |
| TR SFT TRQ  | 2165.90            | 877.10   | 1933.20      | 984.50   | 930.80                | 537.00   |
| CG LONG ACC | .018/.009          |          | .042/-.054   |          | .086/.023             |          |
| CG LAT ACC  | .026               |          | .059/-.019   |          | .030/-.010            |          |
| CG VRT ACC  | 1.102/.940         |          | 1.150/1.030  |          | 1.063/.997            |          |

FLIGHT 16, 8500-LB., AFT C.G.

| PARAMETER   | APPROACH    |          | LANDING    |          |
|-------------|-------------|----------|------------|----------|
|             | MEAN        | OSC      | MEAN       | OSC      |
| MR CH 192   | -           | -        | -          | -        |
| MR BM 192   | -3589.60    | 18076.20 | -2564.00   | 4422.90  |
| MR CH 150   | -           | -        | -          | -        |
| MR BM 150   | -382.20     | 13158.60 | -982.80    | 2893.80  |
| MR BM 35    | 32449.20    | 63739.50 | 22019.10   | 11589.00 |
| DRAG BRACE  | 7002.10     | 6287.60  | 7002.10    | 7002.10  |
| SCISR LK    | 314.64      | 852.72   | 328.32     | 446.88   |
| LONG TUBE   | 372.07      | 577.35   | 179.62     | 192.15   |
| LAT TUBE    | 288.88      | 879.20   | 238.64     | 339.12   |
| COLL TUBE   | 198.90      | 333.54   | 220.32     | 119.34   |
| TR CH 11    | 8008.98     | 1663.20  | 8031.08    | 1260.00  |
| TR BM 11    | -345.60     | 1242.00  | -399.60    | 1177.20  |
| TR CH 21.5  | 9632.68     | 1352.40  | 9498.92    | 1293.60  |
| TR BM 21.5  | 100.10      | 308.00   | -53.90     | 423.50   |
| TR SFT TRQ  | 948.70      | 823.40   | 2219.60    | 733.90   |
| CG LONG ACC | .099/.093   |          | .144/-.071 |          |
| CG LAT ACC  | .012/0      |          | .032/-.004 |          |
| CG VRT ACC  | 1.090/1.030 |          | 1.144/.982 |          |

# FLIGHT 19, 8500-LB., AFT C.G.

| PARAMETER   | ROTOR START |            | FLAT PITCH |            | FLAT PITCH |            |
|-------------|-------------|------------|------------|------------|------------|------------|
|             | 0 KTS       | 242.75 RPM | 0 KTS      | 324.41 RPM | 0 KTS      | 246.61 RPM |
|             | 10.83 PSI   | -4000 FT   | 13.22 PSI  | -4000 FT   | 7.34 PSI   | -4000 FT   |
|             | -18.40 °F   |            | -18.40 °F  |            | -18.40 °F  |            |
|             | MEAN        | OSC        | MEAN       | OSC        | MEAN       | OSC        |
| MR CH 192   | 35.27       | 8737.25    | -7149.07   | 9411.50    | 21.98      | 6722.50    |
| MR BM 192   | 1076.44     | 5255.56    | 1266.40    | 1899.60    | 1329.72    | 5064.60    |
| MR CH 150   | -343.76     | 20453.84   | 2017.15    | 12086.36   | 5726.56    | 14875.52   |
| MR BM 150   | 4095.00     | 2784.60    | 4695.60    | 1583.40    | 4040.40    | 2402.40    |
| MR BM 35    | -43794.16   | 14098.12   | -53092.92  | 8998.80    | -48293.56  | 12298.36   |
| DRAG BRACE  | 3609.00     | 2454.12    | 7001.46    | 793.98     | 3536.82    | 1227.06    |
| SCISR LK    | 96.60       | 243.60     | 205.80     | 126.00     | 109.20     | 168.00     |
| LONG TUBE   | 160.42      | 308.50     | 135.74     | 197.44     | 135.74     | 296.16     |
| LAT TUBE    | 50.28       | 502.80     | 37.71      | 175.98     | 37.71      | 339.39     |
| COLL TUBE   | 164.81      | 70.20      | 329.62     | 73.25      | 180.07     | 76.30      |
| TR CH 11    | -2878.88    | 1245.92    | -1105.60   | 1198.00    | .13        | 670.88     |
| TR BM 11    | -229.90     | 846.46     | -532.95    | 1149.50    | -543.40    | 940.50     |
| TR CH 21.5  | -1443.59    | 1023.75    | -352.24    | 656.25     | .15        | 892.50     |
| TR BM 21.5  | -128.13     | 331.63     | -293.94    | 399.46     | -278.87    | 354.24     |
| TR SFT TRQ  | 715.20      | 1716.48    | 1233.72    | 697.32     | 679.44     | 1037.04    |
| CG LONG ACC | .016        |            | .040       |            | .032       |            |
| CG LAT ACC  | .069        |            | .083       |            | .077       |            |
| CG VRT ACC  | 1.066       |            | 1.095      |            | 1.073      |            |

## FLIGHT 19, 8500-LB., AFT C.G.

| PARAMETER   | IGE HOVER |            | IGE HOVER |            | LEFT SIDE' RD FLIGHT |            |
|-------------|-----------|------------|-----------|------------|----------------------|------------|
|             | 0 KTS     | 322.38 RPM | 0 KTS     | 310.90 RPM | 0 KTS                | 323.44 RPM |
|             | 33.23 PSI | -4000 FT   | 33.51 PSI | -4000 FT   | 36.63 PSI            | -4000 FT   |
|             | -18.40 °F |            | -18.40 °F |            | -18.40 °F            |            |
|             | MEAN      | OSC        | MEAN      | OSC        | MEAN                 | OSC        |
| MR CH 192   | 2389.36   | 11428.25   | -842.82   | 14789.50   | 2937.93              | 25545.50   |
| MR BM 192   | -1899.60  | 4432.40    | -1772.96  | 4494.72    | -1076.44             | 3609.24    |
| MR CH 150   | 13366.49  | 17664.68   | 9487.38   | 20453.84   | 11772.06             | 21383.56   |
| MR BM 150   | 3603.60   | 3221.40    | 3822.00   | 3549.00    | 4204.20              | 2730.00    |
| MR BM 35    | 30895.88  | 9598.72    | 38394.88  | 8698.84    | 31195.84             | 8698.84    |
| DRAG BRACE  | -5630.04  | 1371.42    | 5196.96   | 1515.78    | 5702.22              | 1876.68    |
| SCISR LK    | 79.80     | 159.60     | 42.00     | 163.80     | 88.20                | 210.00     |
| LONG TUBE   | 98.72     | 209.78     | 111.06    | 222.12     | 185.10               | 308.50     |
| LAT TUBE    | 62.85     | 238.83     | 87.99     | 251.40     | 50.28                | 377.10     |
| COLL TUBE   | 115.98    | 91.56      | 73.25     | 112.92     | 115.98               | 85.46      |
| TR CH 11    | -1046.03  | 1150.08    | -1160.77  | 1198.00    | -1322.84             | 1245.92    |
| TR BM 11    | 83.60     | 1170.40    | 135.85    | 1076.35    | 407.55               | 1463.00    |
| TR CH 21.5  | -501.01   | 603.75     | -618.45   | 577.50     | -705.26              | 945.00     |
| TR BM 21.5  | 75.37     | 369.31     | 135.67    | 399.46     | 60.30                | 459.76     |
| TR SFT TRQ  | 2002.56   | 679.44     | 2091.96   | 590.04     | 2467.44              | 733.08     |
| CG LONG ACC | .112      |            | .140      |            | .160                 |            |
| CG LAT ACC  | .041      |            | .041      |            | .050                 |            |
| CG VRT ACC  | 1.081     |            | 1.088     |            | 1.109                |            |

FLIGHT 19, 8500-LB., AFT C.G.

| PARAMETER   | RIGHT SIDEWARD FLIGHT |            | REARWARD FLIGHT |            | JUMP TAKEOFF |            |
|-------------|-----------------------|------------|-----------------|------------|--------------|------------|
|             | 0 KTS                 | 323.28 RPM | 0 KTS           | 323.36 RPM | 0 KTS        | 323.33 RPM |
|             | 38.92 PSI             | -4000 FT   | 36.63 PSI       | -4000 FT   | 45.53 PSI    | -4000 FT   |
|             | -18.40 °F             |            | -18.40 °F       |            | -18.40 °F    |            |
|             | MEAN                  | OSC        | MEAN            | OSC        | MEAN         | OSC        |
| MR CH 192   | -2218.14              | 13445.00   | -3001.34        | 14789.50   | -1615.24     | 27562.25   |
| MR BM 192   | -1393.04              | 6015.40    | -633.20         | 3862.52    | -569.88      | 8168.78    |
| MR CH 150   | 4715.84               | 17664.68   | 4525.10         | 22313.28   | 3666.91      | 30680.76   |
| MR BM 150   | 4313.40               | 3658.20    | 3931.20         | 5077.80    | 5569.20      | 6388.20    |
| MR BM 35    | 34495.40              | 9598.72    | 30595.92        | 10198.64   | 42594.32     | 15597.92   |
| DRAG BRACE  | 5198.96               | 1804.50    | 5630.04         | 2165.40    | 4475.16      | 5198.46    |
| SCISR LK    | 75.60                 | 210.00     | 54.60           | 210.00     | 42.00        | 495.60     |
| LONG TUBE   | 123.40                | 345.52     | 111.06          | 308.50     | 185.10       | 703.38     |
| LAT TUBE    | -62.85                | 351.96     | -12.57          | 276.54     | -75.42       | 490.23     |
| COLL TUBE   | 106.82                | 54.94      | 112.92          | 73.25      | 91.56        | 143.44     |
| TR CH 11    | -1271.53              | 1509.48    | -1405.00        | 1198.00    | -1327.99     | 2084.52    |
| TR BM 11    | 825.55                | 1776.50    | 282.15          | 1086.80    | 292.60       | 1954.15    |
| TR CH 21.5  | -589.21               | 971.25     | -489.72         | 735.00     | -513.92      | 1312.50    |
| TR BM 21.5  | 527.59                | 474.83     | 165.81          | 399.46     | 301.48       | 474.83     |
| TR SFT TRQ  | 3218.40               | 1037.04    | 2485.32         | 661.56     | 3415.08      | 768.84     |
| CG LONG ACC | .136                  |            | .124            |            | .120         |            |
| CG LAT ACC  | .055                  |            | .028            |            | .022         |            |
| CG VRT ACC  | 1.066                 |            | 1.066           |            | .993         |            |

FLIGHT 19, 8500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |            | POWER TO AUTROTATION |            | STEADY AUTO |            |
|-------------|--------------|------------|----------------------|------------|-------------|------------|
|             | 72.3 KTS     | 324.97 RPM | 83.5 KTS             | 323.14 RPM | 85.1 KTS    | 332.95 RPM |
|             | 26.72 PSI    | 119 FT     | 14.50 PSI            | 203 FT     | 2.48 PSI    | -192 FT    |
|             | -14.88 °F    |            | -15.22 °F            |            | -16.72 °F   |            |
|             | MEAN         | OSC        | MEAN                 | OSC        | MEAN        | OSC        |
| MR CH 192   | -3895.49     | 34284.75   | -8060.45             | 34957.00   | -7761.40    | 33612.50   |
| MR BM 192   | -2976.04     | 8674.84    | -3039.36             | 8801.48    | -4812.32    | 8801.48    |
| MR CH 150   | -253.50      | 61361.52   | 7862.52              | 53923.76   | -7528.79    | 65080.40   |
| MR BM 150   | 3330.60      | 7971.60    | 3276.00              | 8080.80    | 1092.00     | 8736.00    |
| MR BM 35    | 29696.04     | 14998.00   | 30895.88             | 15297.96   | 33895.48    | 19497.40   |
| DRAG BRACE  | 6279.66      | 5702.22    | 7578.90              | 5702.22    | 19272.06    | 8300.70    |
| SCISR LK    | 29.40        | 441.00     | 4.20                 | 445.20     | 239.40      | 462.00     |
| LONG TUBE   | 271.48       | 579.98     | 172.76               | 617.00     | 209.78      | 617.00     |
| LAT TUBE    | 12.67        | 465.09     | 50.28                | 867.33     | 62.85       | 540.51     |
| COLL TUBE   | 88.51        | 177.02     | 103.77               | 183.12     | 363.19      | 338.77     |
| TR CH 11    | -1441.34     | 1916.80    | -2204.29             | 1605.32    | -1008.28    | 1269.88    |
| TR BM 11    | -428.45      | 1651.10    | -1713.80             | 1055.45    | -1745.15    | 1128.60    |
| TR CH 21.5  | 81.48        | 892.50     | 313.64               | 1312.50    | 965.53      | 918.75     |
| TR BM 21.5  | -128.13      | 527.59     | -964.74              | 512.52     | -949.66     | 437.15     |
| TR SFT TRQ  | 911.88       | 929.76     | 679.44               | 2842.92    | 697.32      | 947.64     |
| CG LONG ACC | 0            |            | -.028                |            | .004        |            |
| CG LAT ACC  | 0            |            | 0                    |            | -.036       |            |
| CG VRT ACC  | 1.000        |            | 1.430                |            | .774        |            |

FLIGHT 19, 8500-LB., AFT C.G.

| PARAMETER   | AUTO TO POWER |            | LEVEL FLIGHT |            | POWER TO AUTOROTATION |            |
|-------------|---------------|------------|--------------|------------|-----------------------|------------|
|             | 67.0 KTS      | 325.45 RPM | 105.8 KTS    | 321.91 RPM | 110.5 KTS             | 314.32 RPM |
|             | 15.70 PSI     | - 721 FT   | 41.77 PSI    | 46 FT      | 20.38 PSI             | 206 FT     |
|             | -17.90 °F     |            | -16.89 °F    |            | -16.89 °F             |            |
|             | MEAN          | OSC        | MEAN         | OSC        | MEAN                  | OSC        |
| MR CH 192   | -4565.09      | 38990.50   | 349.79       | 38990.50   | 9361.34               | 44368.50   |
| MR BM 192   | -3799.20      | 9244.72    | -3799.20     | 13550.48   | -3545.92              | 13930.40   |
| MR CH 150   | 454.72        | 57642.64   | 8904.70      | 69729.00   | 35075.35              | 72518.16   |
| MR BM 150   | 3166.80       | 8080.80    | 1419.60      | 13104.00   | 1419.60               | 13158.60   |
| MR BM 35    | 35995.20      | 14998.00   | 31195.84     | 23996.80   | 34195.44              | 24896.68   |
| DRAG BRACE  | 6712.74       | 6496.20    | 4547.34      | 7218.00    | 6568.38               | 8372.88    |
| SCISR LK    | 4.20          | 466.20     | -71.40       | 643.60     | 8.40                  | 592.20     |
| LONG TUBE   | 246.80        | 592.32     | 394.88       | 851.46     | 271.48                | 851.46     |
| LAT TUBE    | 25.14         | 465.09     | 62.85        | 1081.02    | 37.71                 | 1231.86    |
| COLL TUBE   | 112.92        | 201.43     | -36.62       | 396.76     | 189.22                | 405.92     |
| TR CH 11    | -469.63       | 1677.20    | -1109.74     | 1701.16    | -216.55               | 2635.60    |
| TR BM 11    | -470.25       | 1149.50    | 323.95       | 1661.55    | -1442.10              | 1337.60    |
| TR CH 21.5  | 1439.45       | 813.75     | -127.47      | 1076.25    | -400.18               | 1916.25    |
| TR BM 21.5  | -165.81       | 467.29     | 331.63       | 618.03     | -798.92               | 537.59     |
| TR SFT TRQ  | 786.72        | 1069.20    | 2199.24      | 768.84     | 822.48                | 4219.68    |
| CG LONG ACC | -.020         |            | -.060        |            | -.096                 |            |
| CG LAT ACC  | -.038         |            | .030         |            | 0                     |            |
| CG VRT ACC  | .993          |            | .986         |            | 1.467                 |            |

FLIGHT 19, 8500-LB., AFT C.G.

| PARAMETER   | AUTO TO POWER |            | MAX RATE DECEL |            | MAX RATE ACCEL |            |
|-------------|---------------|------------|----------------|------------|----------------|------------|
|             | 97.4 KTS      | 329.48 RPM | 38.2 KTS       | 325.56 RPM | 83.5 KTS       | 323.52 RPM |
|             | 6.80 PSI      | - 693 FT   | 32.77 PSI      | 46 FT      | 39.11 PSI      | 213 FT     |
|             | -19.40 °F     |            | -16.22 °F      |            | -14.21 °F      |            |
|             | MEAN          | OSC        | MEAN           | OSC        | MEAN           | OSC        |
| MR CH 192   | -6864.67      | 41679.50   | -4718.67       | 6652.75    | 10215.66       | 86720.25   |
| MR BM 192   | -5002.28      | 12600.68   | -2532.80       | 15640.04   | -2342.84       | 17159.72   |
| MR CH 150   | -910.87       | 77166.76   | -739.07        | 83674.80   | 4143.46        | 120863.60  |
| MR BM 150   | 2293.20       | 11138.40   | 4641.00        | 12667.20   | 4149.60        | 11739.00   |
| MR BM 35    | 29696.04      | 23996.80   | 27896.28       | 38994.80   | 33295.56       | 50693.24   |
| DRAG BRACE  | 8445.06       | 7939.80    | 6351.84        | 7723.26    | 7218.00        | 9383.40    |
| SCISR LK    | 231.00        | 630.00     | 46.20          | 466.20     | 46.20          | 537.60     |
| LONG TUBE   | 357.86        | 876.14     | 333.18         | 617.00     | 296.16         | 617.00     |
| LAT TUBE    | 125.70        | 1055.88    | 50.28          | 703.92     | 37.71          | 993.03     |
| COLL TUBE   | 253.52        | 434.23     | 109.87         | 183.12     | 73.25          | 238.06     |
| TR CH 11    | -879.84       | 1509.48    | -1566.76       | 1797.00    | -1312.56       | 1916.80    |
| TR BM 11    | -1243.55      | 170.40     | -271.70        | 1442.10    | 114.95         | 1567.50    |
| TR CH 21.5  | -941.93       | 1155.00    | -143.17        | 866.25     | -842.02        | 1250.00    |
| TR BM 21.5  | -525.59       | 489.90     | -7.54          | 452.22     | 173.35         | 595.42     |
| TR SFT TRQ  | 697.32        | 1644.96    | 679.44         | 1001.28    | 1180.08        | 1072.80    |
| CG LONG ACC | -.008         |            | .040           |            | 0              |            |
| CG LAT ACC  | -.022         |            | -.029          |            | -.014          |            |
| CG VRT ACC  | .774          |            | .971           |            | .986           |            |



FLIGHT 19, 8500-LB., AFT C.G.

| POWER TO AUTO |            |          |          | STEADY AUTO |            | POWER RECOVERY IGE |            |
|---------------|------------|----------|----------|-------------|------------|--------------------|------------|
| 84.7 KTS      | 321.00 RPM |          |          | 71.6 KTS    | 329.32 RPM | 34.5 KTS           | 324.61 RPM |
| 9.27 PSI      | -3090 FT   |          |          | 3.95 PSI    | -3608 FT   | 23.59 PSI          | -3903 FT   |
| -23.42 °F     |            |          |          | -25.27 °F   |            | -22.92 °F          |            |
| PARAMETER     | MEAN       | OSC      | MEAN     | OSC         | MEAN       | OSC                |            |
| MR CH 192     | -4445.75   | 39662.75 | -8655.35 | 22184.25    | -3339.97   | 60502.50           |            |
| MR BM 192     | -3545.92   | 8738.16  | -4812.32 | 6205.36     | -2975.04   | 10574.44           |            |
| MR CH 150     | 2694.33    | 65080.40 | -1451.86 | 42767.12    | 608.79     | 86463.96           |            |
| MR BM 150     | 2129.40    | 8626.80  | 327.60   | 6879.60     | 3003.00    | 9172.80            |            |
| MR BM 35      | 17997.60   | 21897.08 | 15297.96 | 20997.20    | 26996.40   | 47093.72           |            |
| DRAG BRACE    | 7939.80    | 6568.38  | 9455.58  | 5774.40     | 6568.38    | 6496.20            |            |
| SCISR LK      | 252.00     | 403.20   | 327.60   | 373.80      | 126.00     | 428.40             |            |
| LONG TUBE     | 259.14     | 456.58   | 234.46   | 518.28      | 246.80     | 542.96             |            |
| LAT TUBE      | 100.56     | 766.77   | 37.71    | 628.50      | 37.71      | 641.07             |            |
| COLL TUBE     | 238.06     | 213.64   | 494.42   | 183.12      | 213.64     | 192.28             |            |
| TR CH 11      | -619.64    | 2066.88  | -588.41  | 1509.48     | -804.48    | 1557.40            |            |
| TR BM 11      | -1640.65   | 1128.60  | -1577.95 | 1233.10     | -553.85    | 1557.05            |            |
| TR CH 21.5    | -852.60    | 2126.25  | 303.06   | 761.25      | 158.92     | 1050.00            |            |
| TR BM 21.5    | -964.74    | 512.52   | -972.27  | 527.59      | -263.80    | 391.92             |            |
| TR SFT TRQ    | 858.24     | 4541.52  | 715.20   | 1233.72     | 876.12     | 1072.80            |            |
| CG LONG ACC   | -.008      |          | -.012    |             | .020       |                    |            |
| CG LAT ACC    | 0          |          | 0        |             | -.008      |                    |            |
| CG VRT ACC    | 1.212      |          | .920     |             | .986       |                    |            |

FLIGHT 19, 8500-LB., AFT C.G.

| IGE HOVER   |            |          |          | IGE HOVER |            |
|-------------|------------|----------|----------|-----------|------------|
| 0 KTS       | 323.72 RPM |          |          | 0 KTS     | 304.42 RPM |
| 34.33 PSI   | -4000 FT   |          |          | 34.98 PSI | -4000 FT   |
| -18.40 °F   |            |          |          | -18.40 °F |            |
| PARAMETER   | MEAN       | OSC      | MEAN     | OSC       |            |
| MR CH 192   | -3500.95   | 17478.50 | 3673.65  | 16134.00  |            |
| MR BM 192   | -696.32    | 4685.68  | -886.48  | 5572.16   |            |
| MR CH 150   | 3666.15    | 19524.12 | 13026.39 | 24172.72  |            |
| MR BM 150   | 4204.20    | 3112.20  | 4149.60  | 3276.00   |            |
| MR BM 35    | 28496.20   | 11998.40 | 36595.2  | 10198.64  |            |
| DRAG BRACE  | 5485.68    | 1443.60  | 4836.06  | 1587.96   |            |
| SCISR LK    | 63.00      | 168.00   | 4.20     | 205.80    |            |
| LONG TUBE   | 98.72      | 209.78   | 111.06   | 308.50    |            |
| LAT TUBE    | 25.14      | 238.83   | 0        | 276.54    |            |
| COLL TUBE   | 122.08     | 91.56    | 79.35    | 88.51     |            |
| TR CH 11    | -939.46    | 1221.96  | -202.57  | 1174.04   |            |
| TR BM 11    | 114.95     | 1149.50  | 418.00   | 1086.80   |            |
| TR CH 21.5  | -252.05    | 787.50   | -70.01   | 787.50    |            |
| TR BM 21.5  | 113.06     | 369.31   | 256.26   | 248.72    |            |
| TR SFT TRQ  | 2127.72    | 661.56   | 2306.52  | 572.16    |            |
| CG LONG ACC | .048       |          | .080     |           |            |
| CG LAT ACC  | .016       |          | .003     |           |            |
| CG VRT ACC  | 1.007      |          | 1.007    |           |            |

# FLIGHT 20, 8500-LB., AFT C.G.

## ROTOR START

## FLAT PITCH

## FLAT PITCH

|           |            |           |            |           |            |
|-----------|------------|-----------|------------|-----------|------------|
| 0 KTS     | 167.72 RPM | 0 KTS     | 318.40 RPM | 0 KTS     | 247.30 RPM |
| 8.09 PSI  | -4352 FT   | 11.44 PSI | -4352 FT   | 6.70 PSI  | -4352 FT   |
| -20.20 °F |            | -20.20 °F |            | -20.20 °F |            |

| PARAMETER   | MEAN        | OSC      | MEAN      | OSC      | MEAN        | OSC      |
|-------------|-------------|----------|-----------|----------|-------------|----------|
| MR CH 192   | 11572.43    | 31027.05 | 7648.60   | 15168.78 | 0.00        | 4315.86  |
| MR BM 192   | 1645.58     | 9816.15  | 759.96    | 7726.26  | 506.64      | 8866.20  |
| MR CH 150   | 15352.74    | 37588.80 | 8277.96   | 22553.28 | 0.00        | 6633.24  |
| MR BM 150   | 2637.64     | 9428.16  | 4377.36   | 5555.88  | 3311.08     | 6117.08  |
| MR BM 35    | -39194.82   | 23019.18 | -52570.83 | 23641.32 | -51326.55   | 20219.55 |
| DRAG BRACE  | 1969.11     | 5834.40  | 7293.00   | 1677.39  | 4011.15     | 1458.60  |
| SCISR LK    | 76.68       | 408.96   | 234.30    | 195.96   | 132.06      | 213.00   |
| LONG TUBE   | -8.52       | 920.16   | -59.64    | 323.76   | -110.76     | 383.40   |
| LAT TUBE    | 93.06       | 389.16   | 93.06     | 507.60   | 76.14       | 338.40   |
| COLL TUBE   | -20.20      | 266.64   | 278.76    | 244.42   | 115.14      | 101.00   |
| TR CH 11    | 13886.18    | 640.42   | -         | -        | -           | -        |
| TR BM 11    | 156.24      | 781.20   | -820.26   | 1236.90  | -644.49     | 657.51   |
| TR CH 21.5  | 1269.26     | 897.12   | 1358.64   | 598.08   | 16.19       | 1289.61  |
| TR BM 21.5  | 46.60       | 321.54   | -512.60   | 419.40   | -293.58     | 191.06   |
| TR SFT TRQ  | 948.69      | 1383.03  | 1257.30   | 628.65   | 731.52      | 1085.85  |
| CG LONG ACC | -.016       |          | .028/0    |          | .008/- .008 |          |
| CG LAT ACC  | .039/.067   |          | .070/.047 |          | .064/.050   |          |
| CG VRT ACC  | 1.045/1.000 |          | 1.023     |          | 1.015       |          |

# FLIGHT 20, 8500-LB., AFT C.G.

## IGE HOVER

## IGE HOVER

## LEFT SIDEWARD FLIGHT

|           |            |           |            |           |            |
|-----------|------------|-----------|------------|-----------|------------|
| 0 KTS     | 322.04 RPM | 0 KTS     | 308.54 RPM | 0 KTS     | 321.76 RPM |
| 35.35 PSI | -4352 FT   | 34.42 PSI | -4352 FT   | 37.68 PSI | -4352 FT   |
| -20.20 °F |            | -20.20 °F |            | -20.20 °F |            |

| PARAMETER   | MEAN        | OSC      | MEAN      | OSC      | MEAN        | OSC      |
|-------------|-------------|----------|-----------|----------|-------------|----------|
| MR CH 192   | 6291.59     | 28958.58 | 10045.17  | 24821.64 | 10110.56    | 16547.76 |
| MR BM 192   | -823.29     | 6649.65  | -1013.28  | 5889.69  | -1076.61    | 5066.40  |
| MR CH 150   | 8051.40     | 30071.04 | 11566.72  | 29131.32 | 9662.66     | 18794.40 |
| MR BM 150   | 4601.84     | 4433.48  | 3872.28   | 5331.40  | 4152.88     | 3647.80  |
| MR BM 35    | 37017.33    | 13376.01 | 42927.66  | 15864.57 | 33906.63    | 8087.82  |
| DRAG BRACE  | 6126.12     | 2552.55  | 5688.54   | 1458.60  | 5980.26     | 2406.69  |
| SCISR LK    | 123.54      | 238.56   | 93.72     | 276.90   | 115.02      | 213.00   |
| LONG TUBE   | 59.64       | 426.00   | 102.24    | 383.40   | 51.12       | 264.12   |
| LAT TUBE    | 93.06       | 406.08   | 101.52    | 296.10   | -8.46       | 296.10   |
| COLL TUBE   | 26.26       | 92.92    | -18.18    | 80.80    | 40.40       | 90.90    |
| TR CH 11    | -           | -        | -         | -        | -           | -        |
| TR BM 11    | 156.24      | 1705.62  | 325.50    | 1347.57  | 377.58      | 1041.60  |
| TR CH 21.5  | 1408.07     | 971.88   | 1073.86   | 1102.71  | 1500.69     | 841.05   |
| TR BM 21.5  | 69.90       | 228.34   | 293.58    | 284.26   | 209.70      | 186.40   |
| TR SFT TRQ  | 2263.14     | 411.48   | 2423.16   | 548.64   | 2743.20     | 800.10   |
| CG LONG ACC | .121/.093   |          | .121/.093 |          | .134/.113   |          |
| CG LAT ACC  | .036/.025   |          | .047/.011 |          | .050/- .017 |          |
| CG VRT ACC  | 1.060/1.023 |          | 1.068     |          | 1.053/1.015 |          |

FLIGHT 20, 8500-LB., AFT C.G.

| PARAMETER   | REARWARD FLIGHT |            | JUMP TAKEOFF |            | LEVEL FLIGHT |            |
|-------------|-----------------|------------|--------------|------------|--------------|------------|
|             | 0 KTS           | 324.14 RPM | 0 KTS        | 321.64 RPM | 72.0 KTS     | 308.63 RPM |
|             | 33.21 PSI       | -4352 FT   | 47.16 PSI    | -4352 FT   | 24.65 PSI    | 1060 FT    |
|             | -20.20 °F       |            | -20.20 °F    |            | -16.95 °F    |            |
|             | MEAN            | OSC        | MEAN         | OSC        | MEAN         | OSC        |
| MR CH 192   | 3494.86         | 27579.60   | -57300.33    | 24132.15   | 27857.45     | 37232.46   |
| MR BM 192   | -759.96         | 7156.29    | -1456.59     | 6269.67    | -2343.21     | 8549.55    |
| MR CH 150   | 7694.67         | 23493.00   | 8070.84      | 28191.60   | 45189.80     | 49805.16   |
| MR BM 150   | 3984.52         | 4489.60    | 5275.28      | 4826.32    | 3816.16      | 7688.44    |
| MR BM 35    | 32351.28        | 12753.87   | 48215.85     | 20219.55   | 34528.77     | 17730.99   |
| DRAG BRACE  | 6271.98         | 3646.60    | 5032.17      | 2917.20    | 6928.35      | 5542.68    |
| SCISR LK    | 127.80          | 264.12     | 89.46        | 430.26     | 29.82        | 481.38     |
| LONG TUBE   | 42.60           | 247.08     | 187.44       | 553.80     | 230.04       | 647.52     |
| LAT TUBE    | 109.98          | 280.70     | -8.46        | 609.12     | -25.38       | 338.40     |
| COLL TUBE   | 48.48           | 121.20     | -12.12       | 129.28     | -8.08        | 193.92     |
| TR CH 11    | -               | -          | -            | -          | -            | -          |
| TR BM 11    | 182.28          | 1184.82    | 651.00       | 1399.65    | -904.89      | 1438.71    |
| TR CH 21.5  | 1423.17         | 1027.95    | 1396.20      | 1588.65    | 4002.68      | 654.15     |
| TR BM 21.5  | 0               | 396.10     | 344.84       | 521.92     | -237.66      | 233.00     |
| TR SFT TRQ  | 2571.75         | 525.78     | 2651.76      | 628.65     | 1200.15      | 651.51     |
| CG LONG ACC | .130/- .085     |            | .150/- .081  |            | 0            |            |
| CG LAT ACC  | .036/- .008     |            | .067/- .050  |            | 0            |            |
| CG VRT ACC  | 1.045/1.000     |            | 1.030/.917   |            | 1.000        |            |

FLIGHT 20, 8500-LB., AFT C.G.

| PARAMETER   | POWER TO AUTOROTATION |            | STEADY AUTO |            | AUTO TO POWER |            |
|-------------|-----------------------|------------|-------------|------------|---------------|------------|
|             | 73.3 KTS              | 325.61 RPM | 73.3 KTS    | 330.78 RPM | 69.1 KTS      | 340.28 RPM |
|             | 15.26 PSI             | 1098 FT    | 2.79 PSI    | 424 FT     | 22.60 PSI     | 70 FT      |
|             | -16.44 °F             |            | -20.20 °F   |            | -20.37 °F     |            |
|             | MEAN                  | OSC        | MEAN        | OSC        | MEAN          | OSC        |
| MR CH 192   | 836.80                | 37232.46   | 3495.19     | 27579.60   | 24139.41      | 41369.40   |
| MR BM 192   | -2026.56              | 9562.83    | -3419.82    | 6016.35    | -4179.78      | 7852.92    |
| MR CH 150   | -24995.10             | 77057.04   | 3708.42     | 52624.32   | 642.47        | 56383.20   |
| MR BM 150   | 3423.32               | 6566.04    | 1234.64     | 6173.20    | 1627.48       | 7015.00    |
| MR BM 35    | -5910.33              | 18042.06   | 23641.32    | 20219.55   | 27374.16      | 21152.76   |
| DRAG BRACE  | 8459.88               | 6271.98    | 9189.18     | 4375.80    | 11450.01      | 8314.02    |
| SCISR LK    | 221.52                | 362.10     | 293.94      | 404.70     | 268.38        | 511.20     |
| LONG TUBE   | 153.36                | 630.48     | 230.04      | 562.32     | 178.92        | 579.36     |
| LAT TUBE    | 84.60                 | 634.50     | -33.84      | 600.66     | -50.76        | 812.16     |
| COLL TUBE   | 329.26                | 131.30     | 428.24      | 300.98     | 236.34        | 450.46     |
| TR CH 11    | -                     | -          | -           | -          | -             | -          |
| TR BM 11    | -1113.21              | 1074.15    | -1725.15    | 878.85     | -631.47       | 1041.60    |
| TR CH 21.5  | 2300.44               | 1887.69    | 3422.11     | 1102.71    | 1276.72       | 1084.02    |
| TR BM 21.5  | -624.44               | 265.62     | -1039.18    | 284.26     | -200.38       | 349.50     |
| TR SFT TRQ  | 1132.57               | 4126.23    | 525.78      | 1154.43    | 1028.70       | 742.95     |
| CG LONG ACC | .004/- .061           |            | .036/- .048 |            | .020/- .036   |            |
| CG LAT ACC  | .045/0                |            | .014/- .017 |            | 0/- .028      |            |
| CG VRT ACC  | 1.409/.919            |            | 1.098/.622  |            | 1.076/.940    |            |

FLIGHT 20, 8500-LB., AFT C.G.

| PARAMETER   | LEVEL FLIGHT |            |  | POWER TO AUTOROTATION |            |  | AUTO TO POWER |            |  |
|-------------|--------------|------------|--|-----------------------|------------|--|---------------|------------|--|
|             | 109.3 KTS    | 321.66 RPM |  | 113.8 KTS             | 322.50 RPM |  | 114.5 KTS     | 324.86 RPM |  |
|             | 37.21 PSI    | 1180 FT    |  | 10.23 PSI             | 791 FT     |  | 7.44 PSI      | - 42 FT    |  |
|             | -16.44 °F    |            |  | -20.37 °F             |            |  | -23.45 °F     |            |  |
|             | MEAN         | OSC        |  | MEAN                  | OSC        |  | MEAN          | OSC        |  |
| MR CH 192   | 6795.72      | 41369.40   |  | 10506.96              | 38611.44   |  | 6668.72       | 57917.16   |  |
| MR BM 192   | -2913.18     | 13869.27   |  | -3039.84              | 12602.67   |  | -3166.50      | 13489.29   |  |
| MR CH 150   | 9902.35      | 65780.40   |  | 6945.88               | 69539.28   |  | 3134.62       | 79876.20   |  |
| MR BM 150   | 1908.09      | 12570.88   |  | 1178.52               | 12627.00   |  | 3086.60       | 14422.84   |  |
| MR BM 35    | 40750.17     | 30173.79   |  | -6532.47              | 21774.90   |  | 36395.19      | 30484.86   |  |
| DRAG BRACE  | 5396.82      | 7001.28    |  | 7438.86               | 7657.65    |  | 7949.37       | 9116.25    |  |
| SCISR LK    | 29.82        | 613.44     |  | 187.44                | 702.90     |  | 170.40        | 894.60     |  |
| LONG TUBE   | 383.40       | 920.16     |  | 323.76                | 749.76     |  | 136.32        | 741.24     |  |
| LAT TUBE    | 25.38        | 1074.42    |  | 177.66                | 1345.14    |  | 169.20        | 1945.80    |  |
| COLL TUBE   | -74.74       | 278.76     |  | 42.42                 | 502.02     |  | 139.38        | 628.22     |  |
| TR CH 11    | -            | -          |  | -                     | -          |  | -             | -          |  |
| TR BM 11    | -32.55       | 1653.54    |  | -1868.37              | 1601.46    |  | -1035.09      | 1549.38    |  |
| TR CH 21.5  | 1806.19      | 1270.92    |  | 1677.74               | 6233.54    |  | 928.33        | 822.36     |  |
| TR BM 21.5  | 251.64       | 442.70     |  | -1141.70              | 377.46     |  | -512.60       | 386.78     |  |
| TR SFT TRQ  | 1794.51      | 822.96     |  | 140.08                | 2468.88    |  | 651.51        | 1508.76    |  |
| CG LONG ACC | -.085        |            |  | -.061/- .109          |            |  | -.036/- .109  |            |  |
| CG LAT ACC  | -.003        |            |  | .017/- .022           |            |  | -.003/- .072  |            |  |
| CG VRT ACC  | .962/.940    |            |  | 1.424/.985            |            |  | 1.000/.849    |            |  |

FLIGHT 20, 8500-LB., AFT C.G.

| PARAMETER   | MAX RATE DECEL |            |  | MAX RATE ACCEL |            |  | POWER TO AUTO |            |  |
|-------------|----------------|------------|--|----------------|------------|--|---------------|------------|--|
|             | 25.0 KTS       | 323.36 RPM |  | 55.0 KTS       | 323.43 RPM |  | 0 KTS         | 327.73 RPM |  |
|             | 36.56 PSI      | 886 FT     |  | 41.40 PSI      | 795 FT     |  | 8.09 PSI      | -4352 FT   |  |
|             | -18.15 °F      |            |  | -17.47 °F      |            |  | -20.20 °F     |            |  |
|             | MEAN           | OSC        |  | MEAN           | OSC        |  | MEAN          | OSC        |  |
| MR CH 192   | 2467.31        | 97218.09   |  | 4442.46        | 34474.50   |  | 1429.49       | 37921.95   |  |
| MR BM 192   | -2786.52       | 19315.65   |  | -3166.50       | 10892.76   |  | -3609.81      | 8486.22    |  |
| MR CH 150   | -3579.84       | 84574.80   |  | 7528.12        | 56383.20   |  | -2903.76      | 46986.00   |  |
| MR BM 150   | 4826.32        | 12851.48   |  | 3142.72        | 10831.16   |  | 2637.64       | 8025.16    |  |
| MR BM 35    | 46349.43       | 46038.36   |  | 48215.85       | 27374.16   |  | -6221.40      | 20219.55   |  |
| DRAG BRACE  | 7074.21        | 13054.47   |  | 4813.38        | 6636.63    |  | 8824.53       | 5688.54    |  |
| SCISR LK    | 102.24         | 852.00     |  | -21.30         | 575.10     |  | 247.08        | 370.62     |  |
| LONG TUBE   | 187.44         | 988.32     |  | 221.52         | 724.20     |  | 178.92        | 604.92     |  |
| LAT TUBE    | 67.68          | 1269.00    |  | 25.38          | 380.70     |  | 33.84         | 981.36     |  |
| COLL TUBE   | 22.22          | 436.32     |  | -107.06        | 262.60     |  | 72.72         | 224.22     |  |
| TR CH 11    | -              | -          |  | -              | -          |  | -             | -          |  |
| TR BM 11    | 39.06          | 2128.77    |  | -266.91        | 1575.42    |  | -748.65       | 1386.63    |  |
| TR CH 21.5  | 2781.50        | 1439.13    |  | 2365.84        | 1084.02    |  | 1639.92       | 1214.85    |  |
| TR BM 21.5  | 27.96          | 680.36     |  | 23.30          | 354.16     |  | -941.32       | 507.94     |  |
| TR SFT TRQ  | 2686.05        | 1177.29    |  | 937.26         | 1108.71    |  | 640.08        | 914.40     |  |
| CG LONG ACC | .089/- .061    |            |  | .097/.008      |            |  | .024/- .065   |            |  |
| CG LAT ACC  | -.022/- .092   |            |  | -.022/- .072   |            |  | .028/0        |            |  |
| CG VRT ACC  | 1.015/.932     |            |  | 1.015/.940     |            |  | 1.378/.962    |            |  |

FLIGHT 20, 8500-LB., AFT C.G.

| PARAMETER   | STEADY AUTO |            | AUTO TO POWER IGE |            | IGE HOVER |            |
|-------------|-------------|------------|-------------------|------------|-----------|------------|
|             | 0 KTS       | 330.71 RPM | 0 KTS             | 325.11 RPM | 0 KTS     | 322.85 RPM |
|             | 2.33 PSI    | -4352 FT   | 21.30 PSI         | -4352 FT   | 34.88 PSI | -4352 FT   |
|             | -20.20 °F   |            | -20.20 °F         |            | -20.20 °F |            |
|             | MEAN        | OSC        | MEAN              | OSC        | MEAN      | OSC        |
| MR CH 192   | 1522.16     | 26890.11   | 2886.37           | 24132.15   | 4525.52   | 18616.23   |
| MR BM 192   | -4053.12    | 7156.29    | -2089.89          | 13299.30   | -1013.28  | 4496.43    |
| MR CH 150   | -5516.24    | 48865.44   | 3468.96           | 70479.00   | 2346.54   | 19734.12   |
| MR BM 150   | 561.20      | 7295.60    | 4096.76           | 8418.00    | 4657.96   | 2974.36    |
| MR BM 35    | 16797.78    | 19286.34   | 32973.42          | 41372.31   | 37950.54  | 9643.17    |
| DRAG BRACE  | 9553.83     | 6126.12    | 7001.28           | 7074.21    | 5761.47   | 1458.60    |
| SCISR LK    | 340.80      | 426.00     | 170.40            | 536.76     | 110.76    | 255.60     |
| LONG TUBE   | 221.52      | 596.40     | 127.80            | 630.48     | 59.64     | 255.60     |
| LAT TUBE    | 0           | 795.24     | 59.22             | 752.94     | 8.46      | 355.32     |
| COLL TUBE   | 428.24      | 232.30     | 121.20            | 197.96     | 82.82     | 68.68      |
| TR CH 11    | -           | -          | -                 | -          | -         | -          |
| TR BM 11    | -2109.24    | 943.95     | -572.88           | 820.26     | 332.01    | 969.99     |
| TR CH 21.5  | 1819.35     | 1140.09    | 1323.41           | 1084.02    | 1748.82   | 934.50     |
| TR BM 21.5  | -1141.70    | 358.82     | -363.48           | 535.90     | 209.70    | 246.98     |
| TR SFT TRQ  | 582.93      | 925.83     | 902.97            | 1028.70    | 2606.04   | 617.22     |
| CG LONG ACC | .020/- .036 |            | .077/- .004       |            | .130/.089 |            |
| CG LAT ACC  | .033/0      |            | .025/- .017       |            | .028/.006 |            |
| CG VRT ACC  | .985/.886   |            | .773/1.204        |            | 1.038     |            |

FLIGHT 20, 8500-LB., AFT C.G.

| PARAMETER   | IGE HOVER |            |
|-------------|-----------|------------|
|             | 0 KTS     | 305.85 RPM |
|             | 32.56 PSI | -4352 FT   |
|             | -20.20 °F |            |
|             | MEAN      | OSC        |
| MR CH 192   | 10003.32  | 12410.82   |
| MR BM 192   | -1013.28  | 5699.70    |
| MR CH 150   | 7384.00   | 19734.12   |
| MR BM 150   | 4096.76   | 3479.44    |
| MR BM 35    | 41061.24  | 13687.08   |
| DRAG BRACE  | 5323.89   | 2187.90    |
| SCISR LK    | 38.34     | 247.08     |
| LONG TUBE   | 119.28    | 383.40     |
| LAT TUBE    | 8.46      | 270.72     |
| COLL TUBE   | 24.24     | 84.84      |
| TR CH 11    | -         | -          |
| TR BM 11    | 312.48    | 1139.25    |
| TR CH 21.5  | 1331.02   | 784.98     |
| TR BM 21.5  | 163.10    | 307.56     |
| TR SFT TRQ  | 2343.15   | 571.50     |
| CG LONG ACC | .146/.073 |            |
| CG LAT ACC  | .042/0    |            |
| CG VRT ACC  | 1.076     |            |

# FLIGHT 21, 9500-LB., FWD C.G.

| FLAT PITCH        |           |          |  | FLAT PITCH         |          |  |  | FLAT PITCH         |          |  |  |
|-------------------|-----------|----------|--|--------------------|----------|--|--|--------------------|----------|--|--|
| 0 KTS 245.1 RPM   |           |          |  | 0 KTS 305.7 RPM    |          |  |  | 0 KTS 317.9 RPM    |          |  |  |
| 7.22 PSI -4420 FT |           |          |  | 11.38 PSI -4420 FT |          |  |  | 12.02 PSI -4420 FT |          |  |  |
| -23.80 °F         |           |          |  | -23.80 °F          |          |  |  | -23.80 °F          |          |  |  |
| PARAMETER         | MEAN      | OSC      |  | MEAN               | OSC      |  |  | MEAN               | OSC      |  |  |
| MR CH 192         | -5540.44  | 12772.75 |  | -20930.28          | 16134.00 |  |  | -5989.50           | 14117.25 |  |  |
| MR BM 192         | 1762.04   | 4719.75  |  | 2202.55            | 3712.87  |  |  | 2076.69            | 4342.17  |  |  |
| MR CH 150         | -7826.00  | 15365.92 |  | -5176.63           | 18247.03 |  |  | 2337.79            | 47058.13 |  |  |
| MR BM 150         | 4912.62   | 3919.06  |  | 5630.20            | 2759.90  |  |  | 6237.37            | 3201.48  |  |  |
| MR BM 35          | -46193.89 | 11698.44 |  | -54592.72          | 11998.40 |  |  | -57292.36          | 11698.44 |  |  |
| DRAG BRACE        | 2971.08   | 1344.06  |  | 1980.72            | 1061.10  |  |  | 6012.90            | 1061.10  |  |  |
| SCISR LK          | 79.78     | 184.76   |  | 163.76             | 146.96   |  |  | 180.56             | 151.16   |  |  |
| LONG TUBE         | -168.42   | 320.80   |  | -144.36            | 200.50   |  |  | -120.30            | 240.60   |  |  |
| LAT TUBE          | -103.21   | 230.23   |  | -63.51             | 198.48   |  |  | -63.51             | 206.41   |  |  |
| COLL TUBE         | 118.98    | 74.84    |  | 268.66             | 122.82   |  |  | 293.61             | 105.54   |  |  |
| TR CH 11          | -         | -        |  | -                  | -        |  |  | -                  | -        |  |  |
| TR BM 11          | -1110.31  | 725.23   |  | -1200.17           | 1277.2   |  |  | -1225.84           | 1078.20  |  |  |
| TR CH 21.5        | -45.96    | 1289.61  |  | -63.65             | 766.29   |  |  | 942.45             | 635.46   |  |  |
| TR BM 21.5        | -452.23   | 246.67   |  | -470.50            | 324.33   |  |  | -488.78            | 319.76   |  |  |
| TR SFT TRQ        | 498.15    | 1118.07  |  | 907.74             | 487.08   |  |  | 985.23             | 542.43   |  |  |
| CG LONG ACC       | .099      |          |  | .103/.087          |          |  |  | .111/.091          |          |  |  |
| CG LAT ACC        | .044      |          |  | .044               |          |  |  | .044               |          |  |  |
| CG VRT ACC        | .985/.993 |          |  | .978/.985          |          |  |  | .993/1.00          |          |  |  |

## FLIGHT 21, 9500-LB., FWD C.G.

| IGE HOVER          |             |          |  | IGE HOVER          |          |  |  | RIGHT HOVLING TURN |          |  |  |
|--------------------|-------------|----------|--|--------------------|----------|--|--|--------------------|----------|--|--|
| 0 KTS 323.3 RPM    |             |          |  | 0 KTS 302.2 RPM    |          |  |  | 0 KTS 320.4 RPM    |          |  |  |
| 38.29 PSI -4420 FT |             |          |  | 37.46 PSI -4420 FT |          |  |  | 39.12 PSI -4420 FT |          |  |  |
| -23.80 °F          |             |          |  | -23.80 °F          |          |  |  | -23.80 °F          |          |  |  |
| PARAMETER          | MEAN        | OSC      |  | MEAN               | OSC      |  |  | MEAN               | OSC      |  |  |
| MR CH 192          | 497.06      | 16876.25 |  | 2174.24            | 20167.50 |  |  | -3150.76           | 33612.50 |  |  |
| MR BM 192          | -943.95     | 4027.52  |  | -881.02            | 5537.84  |  |  | -566.37            | 4719.75  |  |  |
| MR CH 150          | 5471.94     | 17286.66 |  | 3886.46            | 17286.66 |  |  | -5662.57           | 42256.28 |  |  |
| MR BM 150          | 4526.24     | 2980.69  |  | 4747.03            | 4029.45  |  |  | 4967.82            | 6016.58  |  |  |
| MR BM 35           | 41994.40    | 10798.56 |  | 52493.00           | 5699.74  |  |  | 48593.52           | 31495.80 |  |  |
| DRAG BRACE         | 4810.32     | 1697.76  |  | 3607.74            | 1344.06  |  |  | 4102.92            | 2405.16  |  |  |
| SCISR LK           | 58.79       | 104.98   |  | 4.20               | 88.18    |  |  | 41.99              | 235.14   |  |  |
| LONG TUBE          | -272.68     | 232.58   |  | -168.42            | 240.60   |  |  | -288.72            | 481.20   |  |  |
| LAT TUBE           | -142.90     | 190.54   |  | -71.45             | 150.84   |  |  | -111.15            | 436.64   |  |  |
| COLL TUBE          | 46.06       | 80.60    |  | -46.06             | 80.60    |  |  | 42.22              | 239.88   |  |  |
| TR CH 11           | -           | -        |  | -                  | -        |  |  | -                  | -        |  |  |
| TR BM 11           | 179.70      | 1636.6   |  | 494.19             | 1206.6   |  |  | 423.59             | 2188.5   |  |  |
| TR CH 21.5         | 204.81      | 747.6    |  | -433.87            | 1121.4   |  |  | -214.34            | 2161.44  |  |  |
| TR BM 21.5         | 232.97      | 347.17   |  | 338.03             | 401.98   |  |  | 392.85             | 648.66   |  |  |
| TR SFT TRQ         | 2811.78     | 675.27   |  | 2656.80            | 719.55   |  |  | 2634.66            | 1051.65  |  |  |
| CG LONG ACC        | .127/.103   |          |  | .123/.099          |          |  |  | .119/.050          |          |  |  |
| CG LAT ACC         | .008        |          |  | .014/-0.003        |          |  |  | .025/-0.022        |          |  |  |
| CG VRT ACC         | 1.015/1.022 |          |  | 1.015/1.007        |          |  |  | 1.066/1.000        |          |  |  |

FLIGHT 21, 9500-LB., FWD C.G.

| PARAMETER   | VERTICAL TAKEOFF |           | HOVER TO FULL POWER CLIMB |           | FULL POWER CLIMB |           |
|-------------|------------------|-----------|---------------------------|-----------|------------------|-----------|
|             | 0 KTS            | 320.0 RPM | 0 KTS                     | 319.3 RPM | 76.4 KTS         | 319.7 RPM |
|             | 53.00 PSI        | -4420 FT  | 49.30 PSI                 | -4420 FT  | 49.76 PSI        | -3361 FT  |
|             | -23.80 °F        |           | -23.80 °F                 |           | -14.22 °F        |           |
|             | MEAN             | OSC       | MEAN                      | OSC       | MEAN             | OSC       |
| MR CH 192   | 726.03           | 19495.25  | 3643.41                   | 26890.00  | 1112.26          | 22856.50  |
| MR BM 192   | -1762.04         | 5034.40   | -1447.39                  | 7866.25   | -2328.41         | 9942.94   |
| MR CH 150   | -845.12          | 36494.06  | 7582.45                   | 38414.80  | 3727.52          | 33612.95  |
| MR BM 150   | 5685.39          | 3422.28   | 5409.40                   | 5464.60   | 4139.85          | 9273.26   |
| MR BM 35    | 55192.64         | 19797.36  | 59992.00                  | 17397.68  | 55192.64         | 20697.24  |
| DRAG BRACE  | 3324.78          | 3254.04   | 4456.62                   | 6295.86   | 3537.00          | 4881.06   |
| SCISR LK    | 16.80            | 206.34    | 50.39                     | 428.30    | -21.00           | 487.08    |
| LONG TUBE   | 3151.86          | 401.00    | -8.02                     | 569.42    | 112.28           | 737.84    |
| LAT TUBE    | -95.47           | 317.56    | -174.66                   | 492.22    | -134.96          | 428.71    |
| COLL TUBE   | -592.97          | 90.19     | 9.60                      | 95.95     | -32.62           | 189.98    |
| TR CH 11    | -                | -         | -                         | -         | -                | -         |
| TR BM 11    | 1514.65          | 2015.2    | 487.77                    | 2547.9    | 12.84            | 1944.6    |
| TR CH 21.5  | -91.21           | 1801.2    | -282.32                   | 2085.6    | -536.22          | 1649.52   |
| TR BM 21.5  | 351.74           | 497.91    | 507.05                    | 507.05    | 288.28           | 607.54    |
| TR SFT TRQ  | 1760.13          | 453.87    | 2678.94                   | 653.13    | 1881.90          | 996.30    |
| CG LONG ACC | .143/.036        |           | .159/.107                 |           | .095/.067        |           |
| CG LAT ACC  | .036/- .072      |           | .014/0                    |           | .011/.006        |           |
| CG VRT ACC  | 1.081/.971       |           | 1.000/.941                |           | 1.007/1.000      |           |

FLIGHT 21, 9500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |           | LEFT TURN |           | RIGHT TURN |           |
|-------------|--------------|-----------|-----------|-----------|------------|-----------|
|             | 77.9 KTS     | 322.2 RPM | 76.9 KTS  | 322.9 RPM | 77.6 KTS   | 321.8 RPM |
|             | 31.73 PSI    | 1306 FT   | 29.69 PSI | 1279 FT   | 29.41 PSI  | 916 FT    |
|             | -11.53 °F    |           | -11.53 °F |           | -17.75 °F  |           |
|             | MEAN         | OSC       | MEAN      | OSC       | MEAN       | OSC       |
| MR CH 192   | -2789.65     | 34957.00  | -1009.47  | 35629.25  | -2271.21   | 36973.75  |
| MR BM 192   | -2831.85     | 8936.06   | -2454.27  | 8873.13   | -2013.76   | 8873.13   |
| MR CH 150   | -1426.30     | 55701.46  | -4107.25  | 46097.76  | -2365.54   | 52820.35  |
| MR BM 150   | 4139.85      | 8224.50   | 4360.64   | 8334.90   | 3919.06    | 8500.49   |
| MR BM 35    | 44094.12     | 17697.64  | 44994.00  | 17097.72  | 47693.64   | 16497.80  |
| DRAG BRACE  | 5729.94      | 5305.50   | 5164.02   | 5164.02   | 5446.98    | 5305.50   |
| SCISR LK    | -4.199       | 373.71    | -4.199    | 373.71    | -37.79     | 377.91    |
| LONG TUBE   | -32.08       | 609.52    | -8.02     | 681.70    | -32.08     | 802.00    |
| LAT TUBE    | -222.29      | 389.01    | -142.90   | 603.36    | -198.48    | 389.01    |
| COLL TUBE   | 7.68         | 259.07    | -24.95    | 201.50    | -23.03     | 270.58    |
| TR CH 11    | -            | -         | -         | -         | -          | -         |
| TR BM 11    | -821.50      | 1553.2    | -860.01   | 1610.9    | -590.46    | 1277.2    |
| TR CH 21.5  | -            | -         | -         | -         | 167.42     | 796.32    |
| TR BM 21.5  | -342.60      | 511.62    | -287.78   | 584.70    | -63.95     | 379.14    |
| TR SFT TRQ  | 1129.14      | 564.57    | 1195.56   | 653.13    | 1859.76    | 487.08    |
| CG LONG ACC | 0            |           | .004      |           | .004/0     |           |
| CG LAT ACC  | 0            |           | .003/.006 |           | .022       |           |
| CG VRT ACC  | 1.000        |           | .956/.963 |           | 1.022/.904 |           |

FLIGHT 21, 9500-LB., FWD C.G.

| PARAMETER   | COLLECTIVE PULL-UP |           | LEFT SIDESLIP |           | RIGHT SIDESLIP |           |
|-------------|--------------------|-----------|---------------|-----------|----------------|-----------|
|             | 71.6 KTS           | 320.4 RPM | 78.6 KTS      | 322.5 RPM | 78.6 KTS       | 322.1 RPM |
|             | 46.80 PSI          | 1606 FT   | 30.24 PSI     | 1297 FT   | 32.19 PSI      | 848 FT    |
|             | -9.51 °F           |           | -12.71 °F     |           | -17.75 °F      |           |
|             | MEAN               | OSC       | MEAN          | OSC       | MEAN           | OSC       |
| MR CH 192   | -1806.26           | 44368.50  | -489.90       | 41697.50  | 1373.52        | 40335.00  |
| MR BM 192   | -2643.06           | 8936.06   | -2265.48      | 9313.64   | -1636.18       | 8495.55   |
| MR CH 150   | -2781.46           | 62424.05  | -2163.23      | 57622.20  | -3101.55       | 52820.35  |
| MR BM 150   | 5299.01            | 9659.65   | 3919.06       | 8555.69   | 3808.66        | 8279.70   |
| MR BM 35    | 59692.04           | 24296.76  | 47493.80      | 18897.48  | 48593.52       | 18597.52  |
| DRAG BRACE  | 6012.90            | 6012.90   | 5164.02       | 5376.24   | 5800.68        | 5376.24   |
| SCISR LK    | -41.99             | 516.48    | -41.99        | 394.71    | -25.19         | 436.70    |
| LONG TUBE   | -8.02              | 970.42    | -16.04        | 665.66    | -64.16         |           |
| LAT TUBE    | -150.84            | 476.34    | -190.54       | 555.73    | -246.11        | 381.07    |
| COLL TUBE   | -72.92             | 289.77    | -19.19        | 249.47    | -46.06         | 239.88    |
| TR CH 11    | -                  | -         | -             | -         | -              | -         |
| TR BM 11    | 109.11             | 2188.5    | -1046.13      | 1399.1    | -198.96        | 1732.9    |
| TR CH 21.5  | -251.72            | 1554.72   | -             | -         | 257.17         | 1099.68   |
| TR BM 21.5  | 475.07             | 520.75    | -             | -         | -              | -         |
| TR SFT TRQ  | 2136.51            | 974.16    | 487.08        | 531.36    | 2889.27        | 542.43    |
| CG LONG ACC | .048/- .008        |           | -.012         |           | .028/.020      |           |
| CG LAT ACC  | .025/.003          |           | -.038         |           | .036           |           |
| CG VRT ACC  | 1.184/.897         |           | .948/.926     |           | .963/.941      |           |

FLIGHT 21, 9500-LB., FWD C.G.

| PARAMETER   | S-TURN (LEFT, RIGHT) |           | LEVEL FLIGHT |           | LEVEL FLIGHT |           |
|-------------|----------------------|-----------|--------------|-----------|--------------|-----------|
|             | 81.6 KTS             | 323.2 RPM | 90.2 KTS     | 322.1 RPM | 103.6 KTS    | 328.4 RPM |
|             | 29.87 PSI            | 1329 FT   | 32.19 PSI    | 1397 FT   | 37.77 PSI    | 1106 FT   |
|             | -11.19 °F            |           | -11.19 °F    |           | -15.40 °F    |           |
|             | MEAN                 | OSC       | MEAN         | OSC       | MEAN         | OSC       |
| MR CH 192   | 617.18               | 47729.75  | -1315.48     | 32940.25  | -8218.98     | 33612.50  |
| MR BM 192   | -2831.85             | 10823.96  | -3146.50     | 10761.03  | -2454.27     | 12523.07  |
| MR CH 150   | -7726.91             | 71067.38  | 3621.04      | 48018.50  | -14875.98    | 52820.35  |
| MR BM 150   | 3863.86              | 9770.05   | 3698.27      | 9659.65   | 3587.87      | 12916.33  |
| MR BM 35    | 48293.56             | 23096.92  | 44394.08     | 19797.36  | 47993.60     | 25796.56  |
| DRAG BRACE  | 5588.46              | 6295.86   | 5093.28      | 5588.46   | 4810.32      | 6649.56   |
| SCISR LK    | 21.00                | 457.69    | -21.00       | 377.91    | -58.79       | 541.67    |
| LONG TUBE   | -168.42              | 665.66    | 0            | 777.94    | 144.36       | 753.88    |
| LAT TUBE    | -269.93              | 436.64    | -182.60      | 341.38    | -230.23      | 627.18    |
| COLL TUBE   | -21.11               | 383.80    | -36.46       | 247.55    | -15.35       | 201.50    |
| TR CH 11    | -                    | -         | -            | -         | -            | -         |
| TR BM 11    | -635.38              | 1302.85   | -744.49      | 1861.2    | -558.37      | 2483.8    |
| TR CH 21.5  | 62.78                | 1251.36   | 126.34       | 910.0     | -591.51      | 891.12    |
| TR BM 21.5  | -91.36               | 342.60    | -95.93       | 507.05    | 93.95        | 621.25    |
| TR SFT TRQ  | 1428.03              | 464.94    | 1217.70      | 664.20    | 1306.26      | 619.92    |
| CG LONG ACC | .004/- .032          |           | 0/- .028     |           | -.040        |           |
| CG LAT ACC  | -.011/- .008         |           | .016/- .006  |           | -.016        |           |
| CG VRT ACC  | .978/.823            |           | .971/.934    |           | .956/.941    |           |



FLIGHT 21, 9500-LB., FWD C.G.

| PARAMETER   | LEFT TURN |           | RIGHT TURN   |           | CYCLIC PULL-UP |           |
|-------------|-----------|-----------|--------------|-----------|----------------|-----------|
|             | 114.5 KTS | 320.3 RPM | 113.0 KTS    | 321.3 RPM | 99.5 KTS       | 321.3 RPM |
|             | 44.31 PSI | 736 FT    | 44.31 PSI    | 1237 FT   | 41.44 PSI      | 1416 FT   |
|             | -18.76 °F |           | -14.39 °F    |           | -14.22 °F      |           |
|             | MEAN      | OSC       | MEAN         | OSC       | MEAN           | OSC       |
| MR CH 192   | 2356.19   | 47729.75  | -951.82      | 38318.25  | 7115.18        | 56469.00  |
| MR BM 192   | -4593.89  | 15229.06  | -4656.82     | 14788.55  | -3335.29       | 19067.79  |
| MR CH 150   | 7066.34   | 81631.45  | 1740.71      | 71067.38  | 780.34         | 42256.28  |
| MR BM 150   | 7980.69   | 15345.04  | 2428.71      | 14517.07  | 2539.11        | 16890.59  |
| MR BM 35    | 54292.76  | 35695.24  | 52493.00     | 31195.84  | 59092.12       | 48593.52  |
| DRAG BRACE  | 4244.40   | 8842.50   | 3678.48      | 7710.66   | 919.62         | 9903.60   |
| SCISR LK    | -4.20     | 747.42    | -4.20        | 650.84    | -33.59         | 844.00    |
| LONG TUBE   | 224.56    | 1203.00   | 200.50       | 1018.54   | 176.44         | 1066.66   |
| LAT TUBE    | 31.76     | 1246.42   | 47.63        | 944.74    | 23.82          | 1143.22   |
| COLL TUBE   | -19.19    | 491.26    | -30.70       | 449.05    | -51.81         | 592.97    |
| TR CH 11    | -         | -         | -            | -         | -              | -         |
| TR BM 11    | -237.47   | 2785.4    | -224.63      | 2393.9    | -359.41        | 2599.3    |
| TR CH 21.5  | -244.30   | 1308.24   | 56.98        | 1630.56   | 73.85          | 1403.04   |
| TR BM 21.5  | 228.40    | 666.93    | 283.22       | 602.98    | 159.88         | 653.22    |
| TR SFT TRQ  | 1505.52   | 885.60    | 2003.67      | 785.97    | 2125.44        | 830.25    |
| CG LONG ACC | -.056     |           | -.020/- .032 |           | .044/- .079    |           |
| CG LAT ACC  | -.025     |           | .022         |           | .019/.006      |           |
| CG VRT ACC  | .897/.875 |           | .963/.897    |           | 1.162/.669     |           |

FLIGHT 21, 9500-LB., FWD C.G.

| PARAMETER   | COLLECTIVE PULL-UP |           | S-TURN    |           | LEVEL FLIGHT |           |
|-------------|--------------------|-----------|-----------|-----------|--------------|-----------|
|             | 109.6 KTS          | 319.6 RPM | 112.7 KTS | 304.0 RPM | 124.1 KTS    | 318.9 RPM |
|             | 50.78 PSI          | 1021 FT   | 43.28 PSI | 799 FT    | 50.22 PSI    | 873 FT    |
|             | -17.41 °F          |           | -18.67 °F |           | -18.76 °F    |           |
|             | MEAN               | OSC       | MEAN      | OSC       | MEAN         | OSC       |
| MR CH 192   | 3257.67            | 42351.75  | 24179.49  | 44368.50  | 6846.17      | 43696.25  |
| MR BM 192   | -3020.64           | 15166.13  | -4845.61  | 17116.96  | -3083.57     | 13026.51  |
| MR CH 150   | 2050.35            | 72027.75  | 43908.12  | 73948.49  | 8555.03      | 90274.78  |
| MR BM 150   | 2318.32            | 15179.45  | 2428.71   | 14958.66  | 3311.88      | 16614.60  |
| MR BM 35    | 57892.28           | 35995.20  | 57592.32  | 28796.16  | 54592.72     | 45593.92  |
| DRAG BRACE  | 2900.34            | 7003.26   | 4810.32   | 7852.14   | 5871.42      | 6366.00   |
| SCISR LK    | -37.79             | 697.03    | 4.20      | 701.23    | -25.19       | 999.36    |
| LONG TUBE   | 216.54             | 994.48    | 8.02      | 609.52    | 368.92       | 1243.10   |
| LAT TUBE    | 7.94               |           | 71.45     | 1302.00   | -39.70       | 1921.24   |
| COLL TUBE   | 49.89              | 431.78    | -17.27    | 470.16    | -47.98       | 663.97    |
| TR CH 11    | -                  | -         | -         | -         | -            | -         |
| TR BM 11    | 77.02              | 2689.1    | -121.94   | 2297.64   | 70.60        | 2978.0    |
| TR CH 21.5  | -229.77            | 1839.12   | 1047.03   | 1820.16   | -103.22      | 1858.08   |
| TR BM 21.5  | 424.82             | 785.70    | 228.40    | 758.29    | 356.30       | 854.22    |
| TR SFT TRQ  | 1870.83            | 1040.58   | 1428.03   | 1140.21   | 1826.55      | 1250.91   |
| CG LONG ACC | -.012/- .036       |           | -.040     |           | -.052        |           |
| CG LAT ACC  | .006               |           | -.016     |           | -.011        |           |
| CG VRT ACC  | 1.066/.632         |           | .963/.823 |           | .948/.926    |           |

# FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | IGE HOVER   |            | IGE HOVER   |            | LEFT HOVERING TURN |            |
|-------------|-------------|------------|-------------|------------|--------------------|------------|
|             | 0 KTS       | 321.67 RPM | 0 KTS       | 321.67 RPM | 0 KTS              | 356.32 RPM |
|             | 36.9 PSI    | -3853 FT   | 35.8 PSI    | -3853 FT   | 37.5 PSI           | -3853 FT   |
|             | -27.40 °F   |            | -27.40 °F   |            | -27.40 °F          |            |
|             | MEAN        | OSC        | MEAN        | OSC        | MEAN               | OSC        |
| MR CH 192   | -           | 21512.00   | -           | 17478.50   | -                  | 16806.25   |
| MR BM 192   | -1013.20    | 5192.65    | -2279.70    | 5066.00    | -1773.10           | 5699.25    |
| MR CH 150   | -           | 27598.20   | -           | 22078.56   | -                  | 23918.44   |
| MR BM 150   | 3829.71     | 3496.69    | 3108.17     | 3774.20    | 3718.70            | 3829.71    |
| MR BM 35    | 35715.06    | 14830.83   | 46308.51    | 15133.50   | 33596.37           | 10593.45   |
| DRAG BRACE  | 5894.75     | 1872.45    | 5131.90     | 2080.50    | 5756.05            | 1733.75    |
| SCISR LK    | 67.18       | 117.57     | 37.79       | 167.96     | 71.38              | 138.57     |
| LONG TUBE   | 91.04       | 260.10     | 182.07      | 338.13     | 130.05             | 273.10     |
| LAT TUBE    | 103.44      | 258.60     | 245.67      | 426.69     | 129.30             | 258.60     |
| COLL TUBE   | 131.24      | 103.77     | 103.77      | 100.72     | 132.33             | 122.08     |
| TR CH 11    | -           | -          | -           | -          | -                  | -          |
| TR BM 11    | -           | -          | -           | -          | -                  | -          |
| TR CH 21.5  | -           | 965.25     | -           | 1222.65    | -                  | 1051.05    |
| TR BM 21.5  | 330.96      | 319.14     | 549.63      | 265.95     | 348.69             | 289.59     |
| TR SFT TRQ  | 2490.25     | 654.58     | 2789.08     | 768.42     | 2888.69            | 498.05     |
| CG LONG ACC | .116/.100   |            | .096/.080   |            | .116/.072          |            |
| CG LAT ACC  | .031/.003   |            | .014/.006   |            | .020/.006          |            |
| CG VRT ACC  | 1.037/1.067 |            | 1.022/1.067 |            | 1.030/1.052        |            |

## FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | RIGHT HOVERING TURN |            | VERTICAL TAKEOFF |            | HOVER TO FULL POWER CLIMB |            |
|-------------|---------------------|------------|------------------|------------|---------------------------|------------|
|             | 0 KTS               | 321.22 RPM | 0 KTS            | 318.48 RPM | 0 KTS                     | 319.16 RPM |
|             | 36.0 PSI            | -3853 FT   | 48.9 PSI         | -3853 FT   | 45.8 PSI                  | -3853 FT   |
|             | -27.40 °F           |            | -27.40 °F        |            | -27.40 °F                 |            |
|             | MEAN                | OSC        | MEAN             | OSC        | MEAN                      | OSC        |
| MR CH 192   | -                   | 13445.00   | -                | 22856.50   | -                         | 14117.25   |
| MR BM 192   | -1329.82            | 5319.30    | 2786.30          | 4686.05    | -1519.80                  | 6015.88    |
| MR CH 150   | -                   | 20238.68   | -                | 33117.84   | -                         | 20238.68   |
| MR BM 150   | 3940.71             | 3663.20    | 3163.67          | 3718.70    | 4717.76                   | 3996.22    |
| MR BM 35    | 36925.74            | 9988.11    | 42676.47         | 15738.84   | 52059.24                  | 13620.15   |
| DRAG BRACE  | 5686.70             | 2080.50    | 5478.65          | 4369.05    | 4993.20                   | 3398.15    |
| SCISR LK    | 75.58               | 125.97     | 71.38            | 205.75     | 58.79                     | 251.94     |
| LONG TUBE   | 65.02               | 195.08     | 39.02            | 364.14     | 91.04                     | 208.08     |
| LAT TUBE    | 90.51               | 258.60     | 38.79            | 400.83     | 103.44                    | 258.60     |
| COLL TUBE   | 128.18              | 61.04      | 106.82           | 122.08     | 115.98                    | 91.56      |
| TR CH 11    | -                   | -          | -                | -          | -                         | -          |
| TR BM 11    | -                   | -          | -                | -          | -                         | -          |
| TR CH 21.5  | -                   | 750.75     | -                | 1544.40    | -                         | 1372.80    |
| TR BM 21.5  | 218.67              | 248.22     | 585.09           | 390.06     | 401.88                    | 502.35     |
| TR SFT TRQ  | 2347.95             | 554.97     | 3030.99          | 597.66     | 2917.15                   | 754.19     |
| CG LONG ACC | .116/.092           |            | .140/.052        |            | .136/.096                 |            |
| CG LAT ACC  | .020/0              |            | .059/-.014       |            | .020/-.008                |            |
| CG VRT ACC  | 1.030/1.044         |            | 1.022/.933       |            | 1.022/.956                |            |

FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | FULL POWER CLIMB |          | LEVEL FLIGHT |          | LEVEL FLIGHT |          |
|-------------|------------------|----------|--------------|----------|--------------|----------|
|             | MEAN             | OSC      | MEAN         | OSC      | MEAN         | OSC      |
| MR CH 192   | -                | 17478.50 | -            | 32940.25 | -            | 33612.50 |
| MR BM 192   | -3166.25         | 8358.90  | -3989.48     | 7345.70  | -3926.15     | 9055.48  |
| MR CH 150   | -                | 33117.84 | -            | 45997.00 | -            | 51516.64 |
| MR BM 150   | 4606.75          | 3663.20  | 2553.14      | 7437.40  | 2941.66      | 8658.47  |
| MR BM 35    | 4827.20          | 19976.22 | 35412.39     | 19370.88 | 35412.39     | 20884.23 |
| DRAG BRACE  | 4438.40          | 5201.25  | 7697.85      | 4854.50  | 7004.35      | 5062.55  |
| SCISR LK    | 8.40             | 436.70   | 53.59        | 293.93   | 41.99        | 289.73   |
| LONG TUBE   | 338.13           | 767.30   | 169.06       | 507.20   | 234.09       | 533.20   |
| LAT TUBE    | 0                | 374.97   | 25.86        | 310.32   | -12.93       | 387.90   |
| COLL TUBE   | 48.83            | 177.02   | 109.87       | 119.03   | 88.51        | 186.17   |
| TR CH 11    | -                | -        | -            | -        | -            | -        |
| TR BM 11    | -                | -        | -            | -        | -            | -        |
| TR CH 21.5  | -                | 1158.30  | -            | 793.65   | -            | 815.10   |
| TR BM 21.5  | 390.06           | 549.63   | -354.60      | 407.79   | -165.48      | 419.61   |
| TR SFT TRQ  | 1750.29          | 711.50   | 825.34       | 640.35   | 711.50       | 825.34   |
| CG LONG ACC | .080/.064        |          | .008         |          | 0            |          |
| CG LAT ACC  | .039/.025        |          | .011         |          | 0            |          |
| CG VRT ACC  | 1.007/1.030      |          | 1.000/1.007  |          | 1.000        |          |

FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | LEFT TURN   |          | RIGHT TURN  |          | CYCLIC PULL-UP |          |
|-------------|-------------|----------|-------------|----------|----------------|----------|
|             | MEAN        | OSC      | MEAN        | OSC      | MEAN           | OSC      |
| MR CH 192   | -           | 33612.50 | -           | 32940.25 | -              | 43696.25 |
| MR BM 192   | -4369.42    | 9118.80  | -3672.85    | 8548.88  | -3989.48       | 9182.12  |
| MR CH 150   | -           | 49676.76 | -           | 45077.06 | -              | 63475.86 |
| MR BM 150   | 2830.65     | 8880.48  | 3052.66     | 8769.47  | 2608.64        | 8880.48  |
| MR BM 35    | 36017.73    | 18160.20 | 33899.04    | 16949.52 | 53269.92       | 26937.63 |
| DRAG BRACE  | 6935.00     | 5062.55  | 6796.30     | 4715.80  | 7212.40        | 6102.80  |
| SCISR LK    | 46.19       | 310.73   | 16.80       | 356.92   | 29.39          | 369.51   |
| LONG TUBE   | 234.09      | 650.25   | 234.09      | 559.22   | 130.05         | 637.24   |
| LAT TUBE    | 38.79       | 374.97   | -12.93      | 310.32   | -77.58         | 349.11   |
| COLL TUBE   | 64.09       | 213.64   | 61.04       | 149.55   | 70.20          | 274.68   |
| TR CH 11    | -           | -        | -           | -        | -              | -        |
| TR BM 11    | -           | -        | -           | -        | -              | -        |
| TR CH 21.5  | -           | 1244.10  | -           | 90.90    | -              | 858.00   |
| TR BM 21.5  | -171.39     | 472.80   | -171.39     | 384.15   | -177.30        | 407.79   |
| TR SFT TRQ  | 1465.69     | 583.43   | 796.88      | 654.58   | 981.87         | 683.04   |
| CG LONG ACC | -.016/-.020 |          | 0/-.012     |          | .056/-.052     |          |
| CG LAT ACC  | -.008/-.011 |          | .006        |          | .014/-.006     |          |
| CG VRT ACC  | .993/.539   |          | 1.022/1.015 |          | 1.171/.822     |          |

FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | COLLECTIVE PULL-UP |          | LEFT SIDESLIP |          | RIGHT SIDESLIP |          |
|-------------|--------------------|----------|---------------|----------|----------------|----------|
|             | MEAN               | OSC      | MEAN          | OSC      | MEAN           | OSC      |
| MR CH 192   | -                  | 32940.25 | -             | 36301.50 | -              | 29579.00 |
| MR BM 192   | -3482.88           | 9245.45  | -3926.15      | 8548.88  | -4052.80       | 8232.25  |
| MR CH 150   | -                  | 27598.20 | -             | 52436.58 | -              | 45077.06 |
| MR BM 150   | 3385.68            | 8935.98  | 2608.64       | 8880.48  | 2775.15        | 8602.96  |
| MR BM 35    | 46611.18           | 20278.89 | 38136.42      | 20884.23 | 34201.71       | 18160.20 |
| DRAG BRACE  | 5409.30            | 5548.00  | 6449.55       | 5409.30  | 6380.20        | 4854.50  |
| SCISR LK    | 16.80              | 457.69   | 29.39         | 272.94   | 33.59          | 319.12   |
| LONG TUBE   | 377.14             | 780.30   | 247.10        | 559.22   | 169.06         | 546.21   |
| LAT TUBE    | -25.86             | 452.55   | 25.86         | 452.55   | 0              | 310.32   |
| COLL TUBE   | 6.10               | 180.07   | 67.14         | 207.54   | 79.35          | 155.65   |
| TR CH 11    | -                  | -        | -             | -        | -              | -        |
| TR BM 11    | -                  | -        | -             | -        | -              | -        |
| TR CH 21.5  | -                  | 1158.30  | -             | 729.30   | -              | 686.40   |
| TR BM 21.5  | 224.58             | 449.16   | -183.21       | 307.32   | 112.29         | 413.70   |
| TR SFT TRQ  | 1451.46            | 563.43   | 426.90        | 754.19   | 1721.83        | 199.22   |
| CG LONG ACC | .020/-.028         |          | -.012/-.052   |          | .004/-.008     |          |
| CG LAT ACC  | .028/-.008         |          | -.022/-.073   |          | .073/.045      |          |
| CG VRT ACC  | 1.149/.859         |          | .970/.970     |          | 1.044/.956     |          |

FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | S-TURN     |          | S-TURN     |          | LEVEL FLIGHT |          |
|-------------|------------|----------|------------|----------|--------------|----------|
|             | MEAN       | OSC      | MEAN       | OSC      | MEAN         | OSC      |
| MR CH 192   | -          | 48402.00 | -          | 41007.25 | -            | 26890.00 |
| MR BM 192   | -3799.50   | 10258.65 | -4369.42   | 10068.68 | -3799.50     | 10132.00 |
| MR CH 150   | -          | 66235.68 | -          | 59796.10 | -            | 39557.42 |
| MR BM 150   | 2719.65    | 10434.56 | 2830.65    | 9602.02  | 2719.65      | 10545.57 |
| MR BM 35    | 43887.15   | 21489.57 | 31477.68   | 19976.22 | 34807.05     | 8765.54  |
| DRAG BRACE  | 7489.80    | 5686.70  | 7212.40    | 6310.85  | 63.80        | 4923.85  |
| SCISR LK    | 46.19      | 352.72   | 37.79      | 344.32   | 29.39        | 289.73   |
| LONG TUBE   | 130.05     | 533.20   | 195.08     | 637.24   | 247.10       | 650.25   |
| LAT TUBE    | -12.93     | 374.97   | -51.72     | 374.97   | 25.86        | 323.25   |
| COLL TUBE   | 79.35      | 299.10   | 61.04      | 302.15   | 33.57        | 192.28   |
| TR CH 11    | -          | -        | -          | -        | -            | -        |
| TR BM 11    | -          | -        | -          | -        | -            | -        |
| TR CH 21.5  | -          | 836.55   | -          | 858.00   | -            | 1051.05  |
| TR BM 21.5  | -159.57    | 525.99   | -153.66    | 384.15   | -59.10       | 520.08   |
| TR SFT TRQ  | 711.50     | 725.73   | 853.80     | 697.27   | 768.42       | 654.58   |
| CG LONG ACC | 0/-.048    |          | .020/-.076 |          | -.036/-.028  |          |
| CG LAT ACC  | .003/-.017 |          | .034/.003  |          | -.017        |          |
| CG VRT ACC  | 1.052/.913 |          | 1.067/.866 |          | .963/1.007   |          |

FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |          | POWER TO AUTO |          | STEADY AUTO  |          |
|-------------|--------------|----------|---------------|----------|--------------|----------|
|             | MEAN         | OSC      | MEAN          | OSC      | MEAN         | OSC      |
| MR CH 192   | -            | 38990.50 | -             | 26217.75 | -            | 18150.75 |
| MR BM 192   | -4116.12     | 12031.75 | -2786.30      | 9118.80  | -4559.40     | 8168.92  |
| MR CH 150   | -            | 45077.06 | -             | 44157.12 | -            | 33117.84 |
| MR BM 150   | 1776.10      | 12765.69 | 943.55        | 9158.00  | 166.51       | 8880.48  |
| MR BM 35    | 38741.76     | 18462.87 | -7264.08      | 21489.57 | 19370.88     | 19370.88 |
| DRAG BRACE  | 5617.35      | 5756.05  | 8391.35       | 5548.00  | 9292.90      | 4577.10  |
| SCISR LK    | 67.18        | 373.71   | 264.54        | 331.72   | 285.53       | 310.73   |
| LONG TUBE   | 364.14       | 871.34   | 195.08        | 598.23   | 169.06       | 377.14   |
| LAT TUBE    | -25.86       | 413.76   | 142.23        | 892.17   | 51.72        | 413.76   |
| COLL TUBE   | 39.68        | 158.70   | 424.23        | 225.85   | 415.07       | 213.64   |
| TR CH 11    | -            | -        | -             | -        | -            | -        |
| TR BM 11    | -            | -        | -             | -        | -            | -        |
| TR CH 21.5  | -            | 1136.85  | -             | 900.90   | -            | 858.00   |
| TR BM 21.5  | 35.46        | 650.10   | -856.95       | 265.95   | -827.40      | 319.14   |
| TR SFT TRQ  | 754.19       | 839.57   | 754.19        | 2063.35  | 668.81       | 583.43   |
| CG LONG ACC | -.048/- .040 |          | .604/- .034   |          | -.056/- .080 |          |
| CG LAT ACC  | -.032        |          | .028/- .078   |          | .020/0       |          |
| CG VRT ACC  | 1.000/1.007  |          | 1.297/.978    |          | .963/.807    |          |

FLIGHT 26, 8500-LB., FWD C.G.

| PARAMETER   | AUTO TO POWER IGE |          | LANDING     |          | IGE HOVER   |          |
|-------------|-------------------|----------|-------------|----------|-------------|----------|
|             | MEAN              | OSC      | MEAN        | OSC      | MEAN        | OSC      |
| MR CH 192   | -                 | 72603.00 | -           | 26217.75 | -           | 16134.00 |
| MR BM 192   | -1013.20          | 14818.05 | 379.95      | 7282.38  | -1773.10    | 4052.80  |
| MR CH 150   | -                 | 88314.24 | -           | 32197.90 | -           | 17478.86 |
| MR BM 150   | 3385.68           | 11822.14 | 3829.71     | 5550.30  | 3774.20     | 2775.15  |
| MR BM 35    | 31175.01          | 50243.22 | 20884.23    | 29661.66 | 32385.69    | 7869.42  |
| DRAG BRACE  | 6726.95           | 9709.00  | 7073.70     | 3051.40  | 5756.05     | 1664.40  |
| SCISR LK    | 125.97            | 260.34   | 214.15      | 377.91   | 75.58       | 100.78   |
| LONG TUBE   | 143.06            | 520.20   | -13.00      | 338.13   | 0           | 208.08   |
| LAT TUBE    | 25.86             | 349.11   | 90.51       | 517.20   | 38.79       | 232.74   |
| COLL TUBE   | 213.64            | 280.78   | 366.24      | 134.29   | 137.34      | 57.99    |
| TR CH 11    | -                 | -        | -           | -        | -           | -        |
| TR BM 11    | -                 | -        | -           | -        | -           | -        |
| TR CH 21.5  | -                 | 1115.40  | -           | 707.85   | -           | 815.10   |
| TR BM 21.5  | -780.12           | 243.60   | -715.11     | 354.60   | 212.76      | 236.40   |
| TR SFT TRQ  | 597.66            | 1593.76  | 1408.77     | 996.10   | 2461.79     | 967.64   |
| CG LONG ACC | .024/- .040       |          | .165/- .205 |          | .084/.072   |          |
| CG LAT ACC  | .017/- .017       |          | .050/- .053 |          | .039/.014   |          |
| CG VRT ACC  | 1.007/.889        |          | 1.141/.740  |          | 1.037/1.052 |          |

# FLIGHT 27, 8500-LB., FWD C.G.

| PARAMETER   | ROTOR START |            |  | FLAT PITCH |            |  | FLAT PITCH |            |  |
|-------------|-------------|------------|--|------------|------------|--|------------|------------|--|
|             | 0 KTS       | 184.30 RPM |  | 0 KTS      | 246.40 RPM |  | 0 KTS      | 321.60 RPM |  |
|             | 9.62 PSI    | -4000 FT   |  | 6.87 PSI   | -4000 FT   |  | 11.92 PSI  | -4000 FT   |  |
|             | -29.20 °F   |            |  | -29.20 °F  |            |  | -29.20 °F  |            |  |
|             | MEAN        | OSC        |  | MEAN       | OSC        |  | MEAN       | OSC        |  |
| MR CH 192   | -5193.80    | 13445.00   |  | 28.91      | 12100.50   |  | -968.04    | 12100.50   |  |
| MR BM 192   | 569.92      | 10765.25   |  | 1266.50    | 8485.55    |  | 1329.82    | 4306.10    |  |
| MR CH 150   | 6687.04     | 13799.10   |  | 96.59      | 14719.04   |  | -11938.98  | 15638.98   |  |
| MR BM 150   | 1846.20     | 8416.50    |  | 3638.10    | 5321.40    |  | 4778.40    | 2334.90    |  |
| MR BM 35    | -39704.60   | 74433.60   |  | -51005.14  | 20463.14   |  | -58335.22  | 12522.22   |  |
| DRAG BRACE  | 1556.28     | 1909.98    |  | 4173.66    | 141480     |  | 7074.00    | 1414.80    |  |
| SCISR LK    | 33.60       | 189.00     |  | 92.40      | 285.60     |  | 218.40     | 168.00     |  |
| LONG TUBE   | 76.99       | 320.80     |  | 115.49     | 320.80     |  | 153.98     | 218.14     |  |
| LAT TUBE    | 77.58       | 362.04     |  | 51.72      | 323.25     |  | 77.58      | 168.09     |  |
| COLL TUBE   | 57.99       | 122.08     |  | 180.07     | 192.28     |  | 311.30     | 140.39     |  |
| TR CH 11    | 2155.90     | 866.74     |  | 4.14       | 655.34     |  | -          | -          |  |
| TR BM 11    | -           | -          |  | -          | -          |  | -          | -          |  |
| TR CH 21.5  | 161.93      | 1042.23    |  | .70        | 786.99     |  | -536.34    | 808.26     |  |
| TR BM 21.5  | -346.51     | 205.56     |  | -334.76    | 182.06     |  | -440.48    | 234.92     |  |
| TR SFT TRQ  | 270.37      | 2020.66    |  | 569.20     | 1351.85    |  | 853.80     | 711.50     |  |
| CG LONG ACC | .133/.117   |            |  | .117/.106  |            |  | .125/.106  |            |  |
| CG LAT ACC  | .050/.042   |            |  | .047       |            |  | .053/.044  |            |  |
| CG VRT ACC  | 1.066/1.022 |            |  | 1.037      |            |  | 1.037      |            |  |

## FLIGHT 27, 8500-LB., FWD C.G.

| PARAMETER   | IGE HOVER   |           |  | IGE HOVER   |           |  | LEFT SIDEWARD FLIGHT |           |  |
|-------------|-------------|-----------|--|-------------|-----------|--|----------------------|-----------|--|
|             | 0 KTS       | 320.0 RPM |  | 0 KTS       | 300.9 RPM |  | 0 KTS                | 321.2 RPM |  |
|             | 36.09 PSI   | -4000 FT  |  | 34.44 PSI   | -4000 FT  |  | 35.36 PSI            | -4000 FT  |  |
|             | -29.20 °F   |           |  | -29.20 °F   |           |  | -29.20 °F            |           |  |
|             | MEAN        | OSC       |  | MEAN        | OSC       |  | MEAN                 | OSC       |  |
| MR CH 192   | 6534.94     | 16134.00  |  | 10244.42    | 10756.00  |  | 6959.13              | 11428.25  |  |
| MR BM 192   | -1836.42    | 5192.65   |  | -2279.70    | 4939.35   |  | -1836.42             | 4306.10   |  |
| MR CH 150   | 3042.24     | 24838.38  |  | -191.35     | 24838.38  |  | 1008.25              | 17478.86  |  |
| MR BM 150   | 3692.40     | 3420.90   |  | 3583.80     | 3801.00   |  | 3583.80              | 3203.70   |  |
| MR BM 35    | 33901.62    | 9162.60   |  | 43675.06    | 12522.22  |  | 32679.94             | 7635.50   |  |
| DRAG BRACE  | 6295.86     | 1485.54   |  | 5659.20     | 1909.98   |  | 6366.60              | 1697.76   |  |
| SCISR LK    | 105.00      | 121.80    |  | 50.40       | 126.00    |  | 130.20               | 147.00    |  |
| LONG TUBE   | 89.82       | 320.80    |  | 102.66      | 269.47    |  | 51.33                | 295.14    |  |
| LAT TUBE    | 155.16      | 181.02    |  | 181.02      | 284.46    |  | 193.95               | 155.16    |  |
| COLL TUBE   | 134.29      | 85.46     |  | 70.20       | 70.20     |  | 131.24               | 79.35     |  |
| TR CH 11    | -           | -         |  | -           | -         |  | -                    | -         |  |
| TR BM 11    | -           | -         |  | -           | -         |  | -                    | -         |  |
| TR CH 21.5  | -577.06     | 850.80    |  | -761.81     | 893.34    |  | -1120.76             | 914.61    |  |
| TR BM 21.5  | 387.62      | 311.27    |  | 264.28      | 311.27    |  | 281.90               | 299.52    |  |
| TR SFT TRQ  | 2632.55     | 569.20    |  | 2305.26     | 683.04    |  | 2390.64              | 611.89    |  |
| CG LONG ACC | .133/.090   |           |  | .117/.098   |           |  | .117                 |           |  |
| CG LAT ACC  | .056/.033   |           |  | .050/.042   |           |  | .053/.039            |           |  |
| CG VRT ACC  | 1.066/1.052 |           |  | 1.088/1.037 |           |  | 1.074                |           |  |

FLIGHT 27, 8500-LB., FWD C.G.

| RIGHT SIDEWARD FLIGHT |           |           | REARWARD FLIGHT |           |            | JUMP TAKEOFF |  |  |
|-----------------------|-----------|-----------|-----------------|-----------|------------|--------------|--|--|
|                       | 0 KTS     | 320.2 RPM | 0 KTS           | 320.6 RPM | 0 KTS      | 318.4 RPM    |  |  |
|                       | 37.74 PSI | -4000 FT  | 34.76 PSI       | -4000 FT  | 40.76 PSI  | -4000 FT     |  |  |
|                       | -29.20 °F |           | -29.20 °F       |           | -29.20 °F  |              |  |  |
| PARAMETER             | MEAN      | OSC       | MEAN            | OSC       | MEAN       | OSC          |  |  |
| MR CH 192             | 6942.33   | 18150.75  | 6411.92         | 34284.75  | 7977.59    | 22856.50     |  |  |
| MR BM 192             | -1203.18  | 5635.92   | -1329.82        | 7915.62   | -1963.08   | 5066.00      |  |  |
| MR CH 150             | 711.11    | 23918.44  | -1193.16        | 44157.12  | -4075.33   | 34037.78     |  |  |
| MR BM 150             | 4398.30   | 3638.10   | 4561.20         | 6950.40   | 4018.20    | 4289.70      |  |  |
| MR BM 35              | 35123.30  | 5802.98   | 36344.98        | 25044.44  | 43369.64   | 14965.58     |  |  |
| DRAG BRACE            | 6154.38   | 2475.90   | 6083.64         | 4244.40   | 5659.20    | 4102.92      |  |  |
| SCISR LK              | 92.40     | 105.00    | 63.00           | 264.60    | 96.60      | 168.00       |  |  |
| LONG TUBE             | 102.66    | 0         | 51.33           | 436.29    | 102.66     | 269.47       |  |  |
| LAT TUBE              | 168.09    | 0         | 103.44          | 323.25    | 245.67     | 362.04       |  |  |
| COLL TUBE             | 131.24    | 91.56     | 97.66           | 164.81    | 103.77     | 112.92       |  |  |
| TR CH 11              | -         | -         | -               | -         | -          | -            |  |  |
| TR BM 11              | -         | -         | -               | -         | -          | -            |  |  |
| TR CH 21.5            | -954.79   | 893.34    | -1263.61        | 914.61    | -1128.86   | 1340.01      |  |  |
| TR BM 21.5            | 516.82    | 270.16    | 557.94          | 387.62    | 387.62     | 487.46       |  |  |
| TR SFT TRQ            | 3372.51   | 569.10    | 3045.22         | 583.43    | 2532.94    | 526.51       |  |  |
| CG LONG ACC           | .148/.117 |           | .137/.082       |           | .188/.074  |              |  |  |
| CG LAT ACC            | .047      |           | .056/.031       |           | .064/.116  |              |  |  |
| CG VRT ACC            | 1.059     |           | .978            |           | 1.066/.963 |              |  |  |

FLIGHT 27, 8500-LB., FWD C.G.

| LEVEL FLIGHT |           |           | POWER TO AUTO |           |            | STEADY AUTO |  |  |
|--------------|-----------|-----------|---------------|-----------|------------|-------------|--|--|
|              | 72.6 KTS  | 323.5 RPM | 80.6 KTS      | 325.2 RPM | 70.4 KTS   | 321.2 RPM   |  |  |
|              | 26.48 PSI | 390 FT    | 16.67 PSI     | 757 FT    | 1.74 PSI   | - 342 FT    |  |  |
|              | -13.11 °F |           | -9.46 °F      |           | -15.93 °F  |             |  |  |
| PARAMETER    | MEAN      | OSC       | MEAN          | OSC       | MEAN       | OSC         |  |  |
| MR CH 192    | 9939.22   | 32268.00  | 9000.76       | 25545.50  | 3597.88    | 14117.25    |  |  |
| MR BM 192    | -4369.42  | 8802.18   | -3292.90      | 8105.60   | -3926.15   | 5445.95     |  |  |
| MR CH 150    | -1006.41  | 50596.70  | -1561.14      | 37717.54  | -10950.97  | 25758.32    |  |  |
| MR BM 150    | 2877.90   | 8416.50   | 2063.40       | 8145.00   | 1248.90    | 5918.70     |  |  |
| MR BM 35     | 37261.24  | 16798.10  | 9162.60       | 14965.58  | 12522.22   | 17408.94    |  |  |
| DRAG BRACE   | 7498.44   | 5093.28   | 9266.94       | 4951.80   | 9903.60    | 3395.52     |  |  |
| SCISR LK     | 79.80     | 256.20    | 134.40        | 256.20    | 243.60     | 214.20      |  |  |
| LONG TUBE    | 269.47    | 513.28    | 205.31        | 359.30    | 166.82     | 384.96      |  |  |
| LAT TUBE     | 155.16    | 349.11    | 155.16        | 310.32    | 129.30     | 491.34      |  |  |
| COLL TUBE    | 70.20     | 207.54    | 233.84        | 112.92    | 381.50     | 97.66       |  |  |
| TR CH 11     | -         | -         | -             | -         | -          | -           |  |  |
| TR BM 11     | -         | -         | -             | -         | -          | -           |  |  |
| TR CH 21.5   | -903.61   | 829.53    | -1850.96      | 1127.31   | -780.44    | 978.42      |  |  |
| TR BM 21.5   | -182.06   | 375.87    | -851.58       | 276.03    | -822.22    | 293.65      |  |  |
| TR SFT TRQ   | 654.58    | 825.34    | 512.28        | 1152.63   | 483.82     | 711.50      |  |  |
| CG LONG ACC  | 0         |           | .129/-.020    |           | .020       |             |  |  |
| CG LAT ACC   | 0         |           | .025/.014     |           | .020       |             |  |  |
| CG VRT ACC   | 1.000     |           | 1.317/1.029   |           | 1.132/.971 |             |  |  |

FLIGHT 27, 8500-LB., FWD C.G.

| PARAMETER   | AUTO TO POWER |           | LEVEL FLIGHT |           | CYCLIC PULL-UP |           |
|-------------|---------------|-----------|--------------|-----------|----------------|-----------|
|             | MEAN          | OSC       | MEAN         | OSC       | MEAN           | OSC       |
|             | 74.5 KTS      | 323.3 RPM | 109.9 KTS    | 318.9 RPM | 88.2 KTS       | 323.4 RPM |
|             | 3.02 PSI      | - 500 FT  | 44.25 PSI    | 287 FT    | 33.35 PSI      | 1317 FT   |
|             | -17.59 °F     |           | -14.77 °F    |           | -6.47 °F       |           |
| MR CH 192   | 9668.97       | 37646.00  | 9334.86      | 38990.50  | 11417.49       | 22148.25  |
| MR BM 192   | -5319.30      | 9498.75   | -4496.08     | 15831.25  | -3419.55       | 7788.98   |
| MR CH 150   | -9460.66      | 61635.98  | 1140.73      | 73595.20  | 10281.25       | 30358.02  |
| MR BM 150   | 2334.90       | 8633.70   | 651.60       | 15204.00  | 2497.80        | 9122.40   |
| MR BM 35    | 43064.22      | 25655.28  | 50699.72     | 34512.46  | 14049.32       | 15881.84  |
| DRAG BRACE  | 8842.50       | 5871.42   | 5517.72      | 8771.76   | 6366.60        | 3395.52   |
| SCISR LK    | 138.60        | 336.00    | 4.20         | 756.00    | 0              | 499.80    |
| LONG TUBE   | 243.81        | 384.96    | 397.79       | 936.74    | 384.96         | 718.59    |
| LAT TUBE    | 142.23        | 258.60    | 181.02       | 1422.30   | 129.30         | 413.76    |
| COLL TUBE   | 186.17        | 274.68    | 45.78        | 485.27    | -15.26         | 115.98    |
| TR CH 11    | -             | -         | -            | -         | -              | -         |
| TR BM 11    | -             | -         | -            | -         | -              | -         |
| TR CH 21.5  | -198.51       | 723.18    | -658.58      | 1212.39   | -874.20        | 786.99    |
| TR BM 21.5  | -751.74       | 258.41    | 334.76       | 927.93    | 23.49          | 481.59    |
| TR SFT TRQ  | 711.50        | 1394.54   | 1565.30      | 1323.39   | 2490.25        | 839.57    |
| CG LONG ACC | 0/- .031      |           | -.031        |           | .059/- .031    |           |
| CG LAT ACC  | .006          |           | .033         |           | .056/.008      |           |
| CG VRT ACC  | .926/.819     |           | 1.029/.948   |           | 1.280/.816     |           |

FLIGHT 27, 8500-LB., FWD C.G.

| PARAMETER   | COLLECTIVE PULL-UP |           | POWER TO AUTO |           | STEADY AUTO |           |
|-------------|--------------------|-----------|---------------|-----------|-------------|-----------|
|             | MEAN               | OSC       | MEAN          | OSC       | MEAN        | OSC       |
|             | 107.2 KTS          | 320.6 RPM | 116.4 KTS     | 297.5 RPM | 98.5 KTS    | 295.1 RPM |
|             | 49.01 PSI          | 654 FT    | 23.17 PSI     | - 401 FT  | 4.12 PSI    | -1230 FT  |
|             | -9.79 °F           |           | -19.41 °F     |           | -24.39 °F   |           |
| MR CH 192   | 9773.17            | 39662.75  | 8405.14       | 25545.50  | 16054.00    | 13445.00  |
| MR BM 192   | -6142.52           | 14564.75  | -3292.90      | 12538.35  | -4369.42    | 9688.77   |
| MR CH 150   | 8006.24            | 61635.98  | -10782.62     | 43237.18  | -3485.65    | 30358.02  |
| MR BM 150   | 2443.50            | 15149.70  | 868.80        | 13575.00  | 1248.90     | 9828.30   |
| MR BM 35    | 37872.08           | 33596.20  | 47645.52      | 24128.18  | -2748.78    | 21379.40  |
| DRAG BRACE  | 5659.20            | 5446.98   | 8842.50       | 5659.20   | 8488.80     | 3537.00   |
| SCISR LK    | -4.20              | 739.20    | 172.20        | 546.00    | 205.80      | 378.00    |
| LONG TUBE   | 397.79             | 1013.73   | 295.14        | 642.93    | 243.81      | 346.46    |
| LAT TUBE    | 232.74             | 1034.40   | 64.65         | 646.50    | 168.09      | 633.57    |
| COLL TUBE   | 21.36              | 460.85    | 183.12        | 302.15    | 378.45      | 207.54    |
| TR CH 11    | -                  | -         | -             | -         | -           | -         |
| TR BM 11    | -                  | -         | -             | -         | -           | -         |
| TR CH 21.5  | -774.40            | 1148.58   | 90.31         | 2084.46   | 1439.53     | 1106.04   |
| TR BM 21.5  | 381.74             | 898.57    | -781.11       | 587.30    | -651.90     | 352.38    |
| TR SFT TRQ  | 1408.77            | 868.03    | 256.14        | 6716.56   | 739.96      | 668.81    |
| CG LONG ACC | 0/- .031           |           | .059/- .117   |           | .055/- .070 |           |
| CG LAT ACC  | .047/.045          |           | .123/.039     |           | .056        |           |
| CG VRT ACC  | 1.103/.934         |           | 1.442/.875    |           | 1.059/.735  |           |



FLIGHT 27, 8500-LB., FWD C.G.

| AUTO TO POWER |     |       |     | PARTIAL POWER DESCENT |     |       |     | APPROACH |     |       |     |
|---------------|-----|-------|-----|-----------------------|-----|-------|-----|----------|-----|-------|-----|
| 75.8          | KTS | 327.8 | RPM | 63.5                  | KTS | 324.6 | RPM | 17.0     | KTS | 323.5 | RPM |
| 5.31          | PSI | -1426 | FT  | 16.03                 | PSI | -1444 | FT  | 29.77    | PSI | -2917 | FT  |
| -24.22        | °F  |       |     | -23.06                | °F  |       |     | -16.59   | °F  |       |     |

| PARAMETER   | MEAN        | OSC      | MEAN       | OSC      | MEAN      | OSC       |
|-------------|-------------|----------|------------|----------|-----------|-----------|
| MR CH 192   | 9519.06     | 36973.75 | 13841.63   | 20167.50 | 13300.47  | 87392.50  |
| MR BM 192   | -5002.68    | 11271.85 | -4559.40   | 6522.48  | -2406.35  | 16084.55  |
| MR CH 150   | 2037.67     | 56116.34 | -984.34    | 29438.08 | -8365.93  | 129711.54 |
| MR BM 150   | 5647.20     | 12489.00 | 1900.50    | 6244.50  | 3909.60   | 13955.10  |
| MR BM 35    | 30236.58    | 23822.76 | 21990.24   | 14049.32 | 35123.30  | 49783.46  |
| DRAG BRACE  | 10823.22    | 8205.84  | 9125.46    | 4102.92  | 7781.40   | 9337.68   |
| SCISR LK    | 289.80      | 592.20   | 214.20     | 151.20   | 96.60     | 382.20    |
| LONG TUBE   | 256.64      | 795.58   | 230.98     | 307.97   | 307.97    | 667.26    |
| LAT TUBE    | 297.39      | 1293.00  | 168.09     | 387.90   | 271.53    | 672.36    |
| COLL TUBE   | 427.28      | 433.38   | 225.85     | 137.34   | 183.12    | 311.30    |
| TR CH 11    | -           | -        | -          | -        | -         | -         |
| TR BM 11    | -           | -        | -          | -        | -         | -         |
| TR CH 21.5  | -1192.99    | 786.99   | -1227.49   | 659.37   | -1286.47  | 1276.20   |
| TR BM 21.5  | -281.90     | 311.27   | -422.86    | 252.54   | 41.11     | 293.65    |
| TR SFT TRQ  | 825.34      | 953.41   | 924.95     | 683.04   | 1721.83   | 711.50    |
| CG LONG ACC | .031/- .008 |          | 0          |          | .078/.035 |           |
| CG LAT ACC  | .058/.042   |          | .033       |          | .042/.020 |           |
| CG VRT ACC  | 1.037/.971  |          | 1.074/.963 |          | 1.000     |           |

FLIGHT 27, 8500-LB., FWD C.G.

| LANDING |     |       |     | IGE HOVER |     |       |     | IGE HOVER |     |       |     |
|---------|-----|-------|-----|-----------|-----|-------|-----|-----------|-----|-------|-----|
| 8.0     | KTS | 324.6 | RPM | 0         | KTS | 322.7 | RPM | 0         | KTS | 301.2 | RPM |
| 27.02   | PSI | -2811 | FT  | 36.19     | PSI | -4000 | FT  | 34.44     | PSI | -4000 | FT  |
| -15.10  | °F  |       |     | -29.20    | °F  |       |     | -29.20    | °F  |       |     |

| PARAMETER   | MEAN        | OSC      | MEAN      | OSC      | MEAN      | OSC      |
|-------------|-------------|----------|-----------|----------|-----------|----------|
| MR CH 192   | 7119.13     | 45040.75 | 6203.69   | 19495.25 | 11214.47  | 18150.75 |
| MR BM 192   | -1899.75    | 11905.10 | -2153.05  | 4306.10  | -2469.68  | 4369.42  |
| MR CH 150   | -3744.16    | 71755.32 | -861.06   | 17478.86 | 47872.76  | 11959.22 |
| MR BM 150   | 3529.50     | 9502.50  | 3801.00   | 2715.00  | 3420.90   | 3149.40  |
| MR BM 35    | 18630.62    | 23822.76 | 29625.74  | 9162.60  | 39399.18  | 11605.96 |
| DRAG BRACE  | 7922.88     | 3537.00  | 7074.00   | 1485.54  | 6366.60   | 1697.76  |
| SCISR LK    | 100.80      | 390.60   | 92.40     | 96.60    | 63.00     | 126.00   |
| LONG TUBE   | 102.66      | 538.94   | 64.16     | 230.98   | 102.66    | 179.65   |
| LAT TUBE    | 168.09      | 517.20   | 181.02    | 181.02   | 193.95    | 181.02   |
| COLL TUBE   | 161.76      | 189.22   | 131.24    | 85.46    | 70.20     | 64.09    |
| TR CH 11    | -           | -        | -         | -        | -         | -        |
| TR BM 11    | -           | -        | -         | -        | -         | -        |
| TR CH 21.5  | -1163.68    | 1020.96  | -795.88   | 680.64   | -763.32   | 1042.23  |
| TR BM 21.5  | -604.92     | 364.13   | 317.14    | 370.00   | 416.98    | 276.03   |
| TR SFT TRQ  | 1380.31     | 725.73   | 2433.33   | 739.96   | 2604.09   | 739.96   |
| CG LONG ACC | .160/- .168 |          | .113/.086 |          | .109/.090 |          |
| CG LAT ACC  | .078/- .036 |          | -.106     |          | .039      |          |
| CG VRT ACC  | 1.221/.750  |          | 1.037     |          | 1.059     |          |

# FLIGHT 28, 9500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |          | POWER TO AUTO |          | AUTO TO POWER |          |
|-------------|--------------|----------|---------------|----------|---------------|----------|
|             | MEAN         | OSC      | MEAN          | OSC      | MEAN          | OSC      |
| MR CH 192   | -            | 33095.52 | -             | 36542.97 | -             | 47574.81 |
| MR BM 192   | -3377.16     | 8442.90  | -3439.70      | 9068.30  | -3627.32      | 9943.86  |
| MR CH 150   | -            | 50204.88 | -             | 57642.64 | -             | 60431.80 |
| MR BM 150   | 331.19       | 8279.70  | 3311.88       | 8997.27  | 3587.87       | 8390.10  |
| MR BM 35    | 42453.38     | 16798.10 | 23211.92      | 18325.20 | 49783.46      | 14476.42 |
| DRAG BRACE  | 5800.68      | 5659.20  | 8983.98       | 3890.70  | 6083.64       | 6720.30  |
| SCISR LK    | 0            | 346.04   | 4.22          | 375.58   | 25.32         | 476.86   |
| LONG TUBE   | -74.04       | 567.64   | 0             | 493.60   | 24.88         | 678.70   |
| LAT TUBE    | -140.25      | 395.25   | -153.00       | 497.25   | -229.50       | 369.75   |
| COLL TUBE   | 0            | 228.00   | 158.08        | 261.44   | 45.60         | 206.72   |
| TR CH 11    | -            | -        | -             | -        | -             | -        |
| TR BM 11    | -            | -        | -             | -        | -             | -        |
| TR CH 21.5  | -            | 536.25   | -             | 815.1    | -             | 986.70   |
| TR BM 21.5  | -141.84      | 460.98   | -986.97       | 390.06   | -425.52       | 260.04   |
| TR SFT TRQ  | 896.49       | 540.74   | 597.66        | 1992.20  | 554.97        | 1181.09  |
| CG LONG ACC | 0            |          | .024/- .008   |          | .012/- .032   |          |
| CG LAT ACC  | 0            |          | .025/- .006   |          | .017/0        |          |
| CG VRT ACC  | 1.000        |          | 1.275/.918    |          | .889/.829     |          |

## FLIGHT 28, 9500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |          | POWER TO AUTO |          | AUTO TO POWER |          |
|-------------|--------------|----------|---------------|----------|---------------|----------|
|             | MEAN         | OSC      | MEAN          | OSC      | MEAN          | OSC      |
| MR CH 192   | -            | 44816.85 | -             | 51711.75 | -             | 50332.77 |
| MR BM 192   | -4878.12     | 15384.84 | -5941.30      | 15384.84 | -5003.20      | 12633.08 |
| MR CH 150   | -            | 88323.40 | -             | 79026.20 | -             | 88323.40 |
| MR BM 150   | 2483.91      | 15897.02 | 2483.91       | 14406.68 | 1545.54       | 12253.96 |
| MR BM 35    | 51615.98     | 32679.94 | 22601.08      | 38177.50 | 46729.26      | 30542.00 |
| DRAG BRACE  | 3466.26      | 9479.16  | 7356.96       | 9832.86  | 9266.94       | 9832.86  |
| SCISR LK    | -21.10       | 966.38   | 227.88        | 1021.24  | -223.66       | 759.60   |
| LONG TUBE   | 246.80       | 1369.74  | 98.72         | 1295.70  | 271.48        | 888.48   |
| LAT TUBE    | -140.25      | 1581.00  | 178.50        | 1836.00  | -63.75        | 1275.00  |
| COLL TUBE   | 42.56        | 480.64   | 337.44        | 668.80   | 304.00        | 829.92   |
| TR CH 11    | -            | -        | -             | -        | -             | -        |
| TR BM 11    | -            | -        | -             | -        | -             | -        |
| TR CH 21.5  | -            | 1351.35  | -             | 1287.00  | -             | 1093.95  |
| TR BM 21.5  | 342.78       | 768.30   | -543.72       | 502.35   | -384.15       | 561.45   |
| TR SFT TRQ  | 1166.86      | 1138.40  | 512.28        | 1949.51  | 796.88        | 1109.94  |
| CG LONG ACC | -.016/- .044 |          | .020/- .048   |          | -.040/- .052  |          |
| CG LAT ACC  | -.008/- .017 |          | .034/- .022   |          | .011/- .011   |          |
| CG VRT ACC  | .963         |          | 1.238/1.037   |          | .914/.703     |          |

FLIGHT 28, 9500-LB., FWD C.G.

| PARAMETER   | AUTO TO POWER |          | STEADY AUTO |          | AUTO TO POWER IGE |           |
|-------------|---------------|----------|-------------|----------|-------------------|-----------|
|             | MEAN          | OSC      | MEAN        | OSC      | MEAN              | OSC       |
| MR CH 192   | -             | 33785.01 | -           | 31716.54 | -                 | 79291.35  |
| MR BM 192   | -4502.88      | 10256.56 | -4690.50    | 5816.22  | -1250.80          | 16573.10  |
| MR CH 150   | -             | 58572.36 | -           | 33469.92 | -                 | 107847.52 |
| MR BM 150   | 1214.36       | 10211.63 | 1324.75     | 6513.36  | 3587.87           | 12143.56  |
| MR BM 35    | 21073.98      | 19546.88 | 42147.96    | 26571.54 | -2137.94          | 43675.06  |
| DRAG BRACE  | 8913.24       | 7074.00  | 9408.42     | 5729.94  | 5729.94           | 10611.00  |
| SCISR LK    | 282.74        | 527.50   | 223.66      | 337.60   | 135.04            | 173.02    |
| LONG TUBE   | 86.38         | 493.60   | 12.34       | 419.56   | -74.04            | 555.30    |
| LAT TUBE    | -153.00       | 765.00   | -204.00     | 382.50   | -191.25           | 841.50    |
| COLL TUBE   | 367.84        | 255.36   | 373.92      | 243.20   | 133.76            | 276.64    |
| TR CH 11    | -             | -        | -           | -        | -                 | -         |
| TR BM 11    | -             | -        | -           | -        | -                 | -         |
| TR CH 21.5  | -             | 986.70   | -           | 1072.50  | -                 | 965.25    |
| TR BM 21.5  | -975.15       | 384.15   | -916.05     | 419.61   | -862.86           | 366.42    |
| TR SFT TRQ  | 626.12        | 1892.59  | 441.13      | 1195.32  | 483.82            | 640.35    |
| CG LONG ACC | -.016/- .072  |          | -.032       |          | .068/- .012       |           |
| CG LAT ACC  | .031/.011     |          | .022/- .003 |          | -.003/- .025      |           |
| CG VRT ACC  | 1.364/.792    |          | .918/.792   |          | .978/.859         |           |

FLIGHT 28, 9500-LB., FWD C.G.

| PARAMETER   | LANDING     |          | IGE HOVER   |          | IGE HOVER   |          |
|-------------|-------------|----------|-------------|----------|-------------|----------|
|             | MEAN        | OSC      | MEAN        | OSC      | MEAN        | OSC      |
| MR CH 192   | -           | 18616.23 | -           | 20684.70 | -           | 19305.72 |
| MR BM 192   | -1688.58    | 4502.88  | -1125.72    | 5003.20  | -1876.20    | 5878.76  |
| MR CH 150   | -           | 32540.20 | -           | 17664.68 | -           | 27891.60 |
| MR BM 150   | 4857.42     | 419.05   | 4360.64     | 4029.45  | 4084.65     | 4415.84  |
| MR BM 35    | -47340.10   | 13743.90 | 43369.64    | 10689.70 | 55281.02    | 12216.80 |
| DRAG BRACE  | 6012.90     | 3183.30  | 4668.84     | 2122.20  | 4315.14     | 2475.90  |
| SCISR LK    | 611.90      | 206.78   | 33.76       | 122.38   | 4.22        | 105.5    |
| LONG TUBE   | -185.10     | 246.80   | -111.06     | 185.10   | -148.08     | 197.44   |
| LAT TUBE    | -127.50     | 344.25   | -127.50     | 204.00   | -51.00      | 242.25   |
| COLL TUBE   | 264.48      | 91.20    | 66.88       | 79.04    | 9.12        | 115.52   |
| TR CH 11    | -           | -        | -           | -        | -           | -        |
| TR BM 11    | -           | -        | -           | -        | -           | -        |
| TR CH 21.5  | -           | 1565.85  | -           | 900.90   | -           | 986.70   |
| TR BM 21.5  | -803.76     | 265.95   | 295.50      | 295.50   | 372.33      | 330.96   |
| TR SFT TRQ  | 1024.56     | 1010.33  | 2618.32     | 554.97   | 2433.33     | 825.34   |
| CG LONG ACC | .152/- .261 |          | .080/.068   |          | .092/.068   |          |
| CG LAT ACC  | .048/- .025 |          | .020/- .011 |          | .022/- .011 |          |
| CG VRT ACC  | 1.178/.755  |          | 1.000/1.022 |          | 1.007/1.037 |          |

# FLIGHT 29, 9500-LB., FWD C.G.

| PARAMETER   | ROTOR START |            | FLAT PITCH |            | IGE HOVER |            |
|-------------|-------------|------------|------------|------------|-----------|------------|
|             | 0 KTS       | 236.26 RPM | 0 KTS      | 324.24 RPM | 0 KTS     | 304.11 RPM |
|             | 8.2 PSI     | -3308 FT   | 12.7 PSI   | -3308 FT   | 27.9 PSI  | -3308 FT   |
|             | -18.4 °F    |            | -18.4 °F   |            | -18.4 °F  |            |
|             | MEAN        | OSC        | MEAN       | OSC        | MEAN      | OSC        |
| MR CH 192   | -           | 19918.50   | -          | 20582.45   | -         | 13942.95   |
| MR BM 192   | 1159.76     | 8850.80    | 2258.48    | 4272.80    | -915.60   | 4883.20    |
| MR CH 150   | -           | 15805.24   | -          | 17764.68   | -         | 22313.28   |
| MR BM 150   | 5075.52     | 5815.70    | 7084.58    | 3859.51    | 5974.31   | 3172.20    |
| MR BM 35    | -50394.30   | 26266.12   | -51310.56  | 16492.68   | 50088.88  | 8857.18    |
| DRAG BRACE  | 3572.04     | 2171.24    | 6933.96    | 1751.00    | 4482.56   | 2731.56    |
| SCISR LK    | 148.36      | 279.77     | 228.91     | 368.79     | 38.15     | 100.74     |
| LONG TUBE   | 164.58      | 595.02     | 37.98      | 316.50     | -75.96    | 202.56     |
| LAT TUBE    | 232.74      | 840.45     | 12.93      | 465.48     | -38.79    | 142.23     |
| COLL TUBE   | 222.74      | 238.65     | 359.57     | 155.92     | 35.00     | 127.28     |
| TR CH 11    | -           | 1249.80    | -          | 729.05     | -         | 249.96     |
| TR BM 11    | -           | -          | -          | -          | -         | -          |
| TR CH 21.5  | -           | 1370.85    | -          | 927.96     | -         | 843.60     |
| TR BM 21.5  | -264.15     | 293.50     | -211.32    | 446.12     | 405.03    | 234.80     |
| TR SFT TRQ  | 626.12      | 1294.93    | 1181.09    | 725.73     | 2490.25   | 853.80     |
| CG LONG ACC | .080/.096   |            | .092/.100  |            | .100/.088 |            |
| CG LAT ACC  | .022/.034   |            | .022/.034  |            | 0/- .003  |            |
| CG VRT ACC  | .993        |            | 1.000      |            | 1.022     |            |

## FLIGHT 29, 9500-LB., FWD C.G.

| PARAMETER   | LEFT SIDEWARD FLIGHT |            | RIGHT SIDEWARD FLIGHT |            | REARWARD FLIGHT |            |
|-------------|----------------------|------------|-----------------------|------------|-----------------|------------|
|             | 0 KTS                | 290.35 RPM | 0 KTS                 | 323.00 RPM | 0 KTS           | 322.43 RPM |
|             | 39.3 PSI             | -3308 FT   | 38.6 PSI              | -3308 FT   | 38.7 PSI        | -3308 FT   |
|             | -18.4 °F             |            | -18.4 °F              |            | -18.4 °F        |            |
|             | MEAN                 | OSC        | MEAN                  | OSC        | MEAN            | OSC        |
| MR CH 192   | -                    | 27885.90   | -                     | 20582.45   | -               | 17262.70   |
| MR BM 192   | -915.60              | 3906.56    | -183.12               | 6348.16    | -305.20         | 5371.52    |
| MR CH 150   | -                    | 38118.52   | -                     | 27891.60   | -               | 32540.20   |
| MR BM 150   | 6238.66              | 4546.82    | 6291.53               | 4018.12    | 6397.27         | 4758.30    |
| MR BM 35    | 39704.60             | 24433.60   | 37872.08              | 11911.38   | 40620.86        | 13743.90   |
| DRAG BRACE  | 4972.84              | 1891.08    | 5112.92               | 2871.64    | 4832.76         | 3151.80    |
| SCISR LK    | 30.54                | 237.38     | 46.63                 | 127.17     | 80.54           | 211.95     |
| LONG TUBE   | -177.24              | 620.34     | -113.94               | 316.50     | -113.94         | 443.10     |
| LAT TUBE    | 116.37               | 452.55     | 0                     | 426.69     | -103.44         | 387.90     |
| COLL TUBE   | 114.55               | 222.74     | 98.64                 | 108.19     | 95.46           | 133.64     |
| TR CH 11    | -                    | 624.90     | -                     | 249.96     | -               | 312.45     |
| TR BM 11    | -                    | -          | -                     | -          | -               | -          |
| TR CH 21.5  | -                    | 843.60     | -                     | 949.05     | -               | 970.14     |
| TR BM 21.5  | 287.63               | 358.07     | 328.72                | 516.56     | 363.94          | 299.37     |
| TR SFT TRQ  | 2376.41              | 882.26     | 3785.18               | 583.43     | 2974.07         | 569.20     |
| CG LONG ACC | .088/.048            |            | .096/.060             |            | .103/.068       |            |
| CG LAT ACC  | 0/- .025             |            | .008/- .020           |            | .003/- .011     |            |
| CG VRT ACC  | 1.073/1.000          |            | 1.044/1.007           |            | 1.037/.993      |            |

FLIGHT 29, 9500-LB., FWD C.G.

| PARAMETER   | JUMP TAKEOFF |            | LEVEL FLIGHT |            | POWER TO AUTOROTATION |            |
|-------------|--------------|------------|--------------|------------|-----------------------|------------|
|             | 0 KTS        | 322.46 RPM | 69.2 KTS     | 322.87 RPM | 70.8 KTS              | 329.45 RPM |
|             | 45.2 PSI     | -3308 FT   | 28.4 PSI     | 1186 FT    | 10.1 PSI              | 805 FT     |
|             | -18.4 °F     |            | -36.65 °F    |            | -39.17 °F             |            |
|             | MEAN         | OSC        | MEAN         | OSC        | MEAN                  | OSC        |
| MR CH 192   | -            | 25230.10   | -            | 43156.75   | -                     | 35853.30   |
| MR BM 192   | -793.52      | 3540.32    | -2807.84     | 8240.40    | -2868.88              | 6714.40    |
| MR CH 150   | -            | 28821.32   | -            | 60431.80   | -                     | 46486.00   |
| MR BM 150   | 6027.18      | 3595.16    | 5181.26      | 8564.94    | 3965.25               | 6873.10    |
| MR BM 35    | 38177.50     | 20157.72   | 41537.12     | 22295.66   | 16187.26              | 22906.50   |
| DRAG BRACE  | 4482.56      | 4062.32    | 5603.20      | 6303.60    | 8334.76               | 5953.40    |
| SCISR LK    | 89.02        | 152.60     | 16.96        | 339.12     | 8.48                  | 275.54     |
| LONG TUBE   | 126.60       | 506.40     | -37.98       | 557.04     | -63.30                | 316.50     |
| LAT TUBE    | 38.79        | 517.20     | -181.02      | 374.97     | -168.09               | 374.97     |
| COLL TUBE   | 89.10        | 171.83     | 6.36         | 327.75     | 245.01                | 350.02     |
| TR CH 11    | -            | 624.90     | -            | 208.30     | -                     | 208.30     |
| TR BM 11    | -            | -          | -            | -          | -                     | -          |
| TR CH 21.5  | -            | 1265.40    | -            | 611.61     | -                     | 1033.41    |
| TR BM 21.5  | 405.03       | 581.13     | -170.23      | 387.42     | -827.67               | 587.00     |
| TR SFT TRQ  | 3344.05      | 825.34     | 1223.78      | 597.66     | 711.50                | 939.18     |
| CG LONG ACC | .131/-.044   |            | 0            |            | .024/-.016            |            |
| CG LAT ACC  | .028/-.045   |            | 0            |            | .025/-.026            |            |
| CG VRT ACC  | 1.067/-.918  |            | 1.000        |            | 1.290/-.933           |            |

FLIGHT 29, 9500-LB., FWD C.G.

| PARAMETER   | AUTO TO POWER |            | LEVEL FLIGHT |            | LEFT TURN   |            |
|-------------|---------------|------------|--------------|------------|-------------|------------|
|             | 68.7 KTS      | 323.15 RPM | 105.3 KTS    | 320.31 RPM | 102.8 KTS   | 319.58 RPM |
|             | 3.7 PSI       | 422 FT     | 44.4 PSI     | 1166 FT    | 44.5 PSI    | 1189 FT    |
|             | -38.33 °F     |            | -36.32 °F    |            | -36.16 °F   |            |
|             | MEAN          | OSC        | MEAN         | OSC        | MEAN        | OSC        |
| MR CH 192   | -             | 39173.05   | -            | 45148.60   | -           | 46476.50   |
| MR BM 192   | -3845.52      | 10193.68   | -3296.16     | 14588.56   | -1892.24    | 14771.68   |
| MR CH 150   | -             | 55783.20   | -            | 82745.08   | -           | 83674.80   |
| MR BM 150   | 4916.91       | 7877.63    | 4018.12      | 13693.33   | 5022.65     | 14010.55   |
| MR BM 35    | 37566.66      | 21379.40   | 41842.54     | 33901.62   | 47340.10    | 37872.08   |
| DRAG BRACE  | 8474.84       | 6023.44    | 4272.44      | 8334.76    | 4342.48     | 8895.08    |
| SCISR LK    | 144.13        | 356.08     | -46.63       | 801.17     | -42.39      | 813.89     |
| LONG TUBE   | 0             | 443.10     | 151.92       | 911.52     | 215.22      | 835.56     |
| LAT TUBE    | -155.16       | 310.32     | -51.72       | 1357.65    | -25.86      | 1280.07    |
| COLL TUBE   | 155.92        | 461.39     | 12.73        | 585.49     | 3.18        | 556.85     |
| TR CH 11    | -             | 208.30     | -            | 208.30     | -           | 208.30     |
| TR BM 11    | -             | -          | -            | -          | -           | -          |
| TR CH 21.5  | -             | 843.60     | -            | 1244.31    | -           | 1181.04    |
| TR BM 21.5  | -763.10       | 352.20     | 311.11       | 745.49     | 264.15      | 857.02     |
| TR SFT TRQ  | 569.20        | 1479.92    | 1892.59      | 782.65     | 1807.21     | 754.19     |
| CG LONG ACC | -.028/-.020   |            | -.032/-.016  |            | -.032/-.016 |            |
| CG LAT ACC  | -.003/-.014   |            | .006/-.017   |            | 0/-.011     |            |
| CG VRT ACC  | .970/-.866    |            | .985         |            | 1.007/-.956 |            |

FLIGHT 29, 9500-LB., FWD C.G.

| PARAMETER   | RIGHT TURN  |            | S-TURN      |           | CYCLIC PULL-UP |            |
|-------------|-------------|------------|-------------|-----------|----------------|------------|
|             | 106.1 KTS   | 318.92 RPM | 104.7 KTS   | 318.6 RPM | 95.2 KTS       | 320.24 RPM |
|             | 43.4 PSI    | 1125 FT    | 44.10 PSI   | 1117 FT   | 43.4 PSI       | 1166 FT    |
|             | -36.99 °F   |            | -36.16 °F   |           | -36.32 °F      |            |
|             | MEAN        | OSC        | MEAN        | OSC       | MEAN           | OSC        |
| MR CH 192   | -           | 49132.30   | -           | 43820.70  | -              | 56435.75   |
| MR BM 192   | -2990.96    | 14344.40   | -2624.72    | 15321.04  | -4761.12       | 17396.40   |
| MR CH 150   | -           | 83674.80   | -           | 82745.08  | -              | 96690.88   |
| MR BM 150   | 4652.56     | 14169.16   | 5181.26     | 14486.38  | 4811.17        | 15596.65   |
| MR BM 35    | 49172.62    | 38482.92   | 48867.20    | 36955.82  | 59251.48       | 52226.82   |
| DRAG BRACE  | 4482.56     | 9525.44    | 4342.48     | 8684.96   | 3852.20        | 10786.16   |
| SCISR LK    | -16.96      | 779.98     | -67.82      | 843.56    | -33.91         | 788.45     |
| LONG TUBE   | 265.86      | 936.84     | 215.22      | 886.20    | 392.46         | 1012.80    |
| LAT TUBE    | -25.86      | 1461.09    | 1344.72     | 1409.37   | -38.79         | 1293.00    |
| COLL TUBE   | 25.46       | 525.03     | -9.55       | 585.49    | 31.82          | 509.12     |
| TR CH 11    | -           | 208.30     | -           | -         | -              | 208.30     |
| TR BM 11    | -           | -          | -           | -         | -              | -          |
| TR CH 21.5  | -           | 970.14     | -           | 1349.76   | -              | 1391.44    |
| TR BM 21.5  | 228.93      | 763.10     | 211.32      | 974.42    | 205.45         | 845.28     |
| TR SFT TRQ  | 1792.98     | 725.73     | 1721.83     | 1010.33   | 1579.53        | 896.49     |
| CG LONG ACC | -.032/-.016 |            | -.004/-.012 |           | .020/-.052     |            |
| CG LAT ACC  | .006/.017   |            | .034/.025   |           | .017/-.008     |            |
| CG VRT ACC  | 1.000/.918  |            | 1.044/.911  |           | 1.104/.762     |            |

FLIGHT 29, 9500-LB., FWD C.G.

| PARAMETER   | COLLECTIVE PULL-UP |            | POWER TO AUTOROTATION |            | AUTO TO POWER |            |
|-------------|--------------------|------------|-----------------------|------------|---------------|------------|
|             | 94.7 KTS           | 319.23 RPM | 107.5 KTS             | 323.15 RPM | 96.0 KTS      | 321.02 RPM |
|             | 44.3 PSI           | 1046 FT    | 14.5 PSI              | 920 FT     | 10.1 PSI      | 230 FT     |
|             | -36.16 °F          |            | -36.66 °F             |            | -36.99 °F     |            |
|             | MEAN               | OSC        | MEAN                  | OSC        | MEAN          | OSC        |
| MR CH 192   | -                  | 40500.95   | -                     | 48468.35   | -             | 40500.95   |
| MR BM 192   | -3174.08           | 13428.80   | -3235.12              | 12452.16   | -4455.92      | 12818.40   |
| MR CH 150   | -                  | 66010.12   | -                     | 87393.68   | -             | 79026.20   |
| MR BM 150   | 4388.21            | 13376.11   | 3277.94               | 12900.28   | 3225.07       | 13534.72   |
| MR BM 35    | 49478.04           | 40010.02   | 21379.40              | 30847.42   | 36344.98      | 28404.06   |
| DRAG BRACE  | 4972.84            | 7914.52    | 5603.20               | 9035.16    | 6233.56       | 8825.04    |
| SCISR LK    | -76.30             | 453.57     | 105.98                | 907.15     | 148.36        | 593.46     |
| LONG TUBE   | 177.24             | 708.96     | 253.20                | 987.48     | 227.88        | 949.50     |
| LAT TUBE    | -51.72             | 711.15     | 129.30                | 1551.60    | -12.93        | 1073.19    |
| COLL TUBE   | -31.82             | 334.11     | 162.28                | 684.13     | 162.28        | 525.03     |
| TR CH 11    | -                  | 208.30     | -                     | 208.30     | -             | 312.45     |
| TR BM 11    | -                  | -          | -                     | -          | -             | -          |
| TR CH 21.5  | -                  | 906.87     | -                     | 906.87     | -             | 906.87     |
| TR BM 21.5  | 187.84             | 880.50     | -851.15               | 587.00     | -129.14       | 581.13     |
| TR SFT TRQ  | 1508.38            | 868.03     | 526.51                | 1607.99    | 825.34        | 1252.24    |
| CG LONG ACC | -.008/.008         |            | -.024/-.040           |            | -.048/-.056   |            |
| CG LAT ACC  | 0/.006             |            | .039/.036             |            | .003/-.020    |            |
| CG VRT ACC  | 1.037/.914         |            | 1.163/.985            |            | .956/.889     |            |

FLIGHT 29, 9500-LB., FWD C.G.

| PARTIAL POWER DESCENT |            | APPROACH  |            | LANDING   |            |
|-----------------------|------------|-----------|------------|-----------|------------|
| 69.1 KTS              | 330.47 RPM | 0 KTS     | 322.48 RPM | 0 KTS     | 321.69 RPM |
| 14.0 PSI              | -2127 FT   | 26.8 PSI  | -3308 FT   | 32.4 PSI  | -3308 FT   |
| -36.66 °F             |            | -18.40 °F |            | -18.40 °F |            |

| PARAMETER   | MEAN       | OSC      | MEAN       | OSC       | MEAN       | OSC      |
|-------------|------------|----------|------------|-----------|------------|----------|
| MR CH 192   | -          | 16598.75 | -          | 85649.55  | -          | 23238.25 |
| MR BM 192   | -3113.04   | 6470.24  | -2197.44   | 14954.80  | 1403.92    | 5737.76  |
| MR CH 150   | -          | 28821.32 | -          | 119004.16 | -          | 45556.28 |
| MR BM 150   | 4176.73    | 6344.40  | 5762.83    | 12953.15  | 6238.66    | 5287.00  |
| MR BM 35    | 30542.00   | 23211.92 | 32679.94   | 56502.70  | 40620.86   | 21684.82 |
| DRAG BRACE  | 7424.24    | 4622.64  | 6373.64    | 9105.20   | 4762.72    | 3922.24  |
| SCISR LK    | 144.13     | 220.43   | 110.21     | 351.84    | 80.54      | 199.23   |
| LONG TUBE   | 63.30      | 265.86   | 113.94     | 607.68    | -202.56    | 316.50   |
| LAT TUBE    | 38.79      | 206.88   | 38.79      | 543.06    | -25.86     | 336.18   |
| COLL TUBE   | 200.47     | 178.17   | 162.28     | 222.74    | 73.19      | 175.01   |
| TR CH 11    | -          | 208.30   | -          | 208.30    | -          | 249.96   |
| TR BM 11    | -          | -        | -          | -         | -          | -        |
| TR CH 21.5  | -          | 527.25   | -          | 1138.86   | -          | 717.06   |
| TR BM 21.5  | -516.56    | 211.32   | -117.40    | 352.20    | 82.18      | 287.63   |
| TR SFT TRQ  | 768.42     | 725.73   | 1309.16    | 583.43    | 2091.81    | 597.66   |
| CG LONG ACC | -.008/.008 |          | .084/-.016 |           | .119/-.004 |          |
| CG LAT ACC  | .008/.020  |          | .006/-.014 |           | .078/-.008 |          |
| CG VRT ACC  | .993       |          | 1.007/.918 |           | 1.067/.866 |          |

FLIGHT 29, 9500-LB., FWD C.G.

ICE HOVER

0 KTS 322.00 RPM  
33.7 PSI -3308 FT  
-18.4 °F

| PARAMETER   | MEAN        | OSC      |
|-------------|-------------|----------|
| MR CH 192   | -           | 10623.20 |
| MR BM 192   | -793.52     | 3662.40  |
| MR CH 150   | -           | 17664.68 |
| MR BM 150   | 6132.92     | 2114.80  |
| MR BM 35    | 34512.46    | 6108.40  |
| DRAG BRACE  | 5042.88     | 1400.80  |
| SCISR LK    | 38.15       | 89.02    |
| LONG TUBE   | -113.94     | 189.90   |
| LAT TUBE    | 38.79       | 258.60   |
| COLL TUBE   | 85.91       | 60.46    |
| TR CH 11    | -           | 208.30   |
| TR BM 11    | -           | -        |
| TR CH 21.5  | -           | 759.24   |
| TR BM 21.5  | 158.49      | 258.28   |
| TR SFT TRQ  | 2305.26     | 611.89   |
| CG LONG ACC | .056/.072   |          |
| CG LAT ACC  | .006/.011   |          |
| CG VRT ACC  | 1.030/1.000 |          |

# FLIGHT 30, 9500-LB., FWD C.G.

| PARAMETER   | FLAT PITCH |            | FLAT PITCH |            | FLAT PITCH |            |
|-------------|------------|------------|------------|------------|------------|------------|
|             | 0 KTS      | 246.06 RPM | 0 KTS      | 304.14 RPM | 0 KTS      | 311.11 RPM |
|             | 6.4 PSI    | -3420 FT   | 9.9 PSI    | -3420 FT   | 10.1 PSI   | -3420 FT   |
|             | -18.40 °F  |            | -18.40 °F  |            | -18.40 °F  |            |
|             | MEAN       | OSC        | MEAN       | OSC        | MEAN       | OSC        |
| MR CH 192   | 2.64       | 10342.30   | 7181.63    | 15168.71   | 2285.39    | 13789.74   |
| MR BM 192   | 1346.67    | 8657.14    | 1218.41    | 7053.97    | 897.78     | 6861.59    |
| MR CH 150   | 4.04       | 16386.37   | 1877.63    | 22758.85   | -5942.80   | 18207.08   |
| MR BM 150   | 3814.26    | 4405.20    | 4190.32    | 4781.26    | 4405.20    | 3384.49    |
| MR BM 35    | -50545.39  | 22049.69   | -59928.07  | 14830.68   | -62349.40  | 15436.62   |
| DRAG BRACE  | 3961.44    | 1131.84    | 6366.60    | 1485.54    | 6791.04    | 1202.58    |
| SCISR LK    | 114.45     | 211.95     | 207.71     | 127.17     | 224.67     | 161.08     |
| LONG TUBE   | 101.30     | 278.59     | 101.30     | 189.94     | 126.63     | 240.60     |
| LAT TUBE    | 103.43     | 426.66     | 90.50      | 181.01     | 90.50      | 193.94     |
| COLL TUBE   | 151.61     | 176.36     | 275.37     | 151.61     | 290.48     | 139.23     |
| TR CH 11    | -          | -          | -          | -          | -          | -          |
| TR BM 11    | -          | -          | -          | -          | -          | -          |
| TR CH 21.5  | .32        | 935.84     | -442.73    | 510.46     | -517.64    | 531.72     |
| TR BM 21.5  | -252.54    | 264.28     | -281.90    | 375.87     | -258.41    | 340.63     |
| TR SFT TRQ  | 753.19     | 1018.20    | 1060.05    | 585.82     | 1101.89    | 474.23     |
| CG LONG ACC | .072/.032  |            | .101/.060  |            | .081/.040  |            |
| CG LAT ACC  | .014       |            | .014       |            | .011       |            |
| CG VRT ACC  | .941/1.052 |            | .941/1.052 |            | .866/.978  |            |

## FLIGHT 30, 9500-LB., FWD C.G.

| PARAMETER   | FLAT PITCH |            | IGE HOVER   |            | IGE HOVER   |            |
|-------------|------------|------------|-------------|------------|-------------|------------|
|             | 0 KTS      | 321.91 RPM | 0 KTS       | 317.98 RPM | 0 KTS       | 304.15 RPM |
|             | 10.8 PSI   | -3420 FT   | 37.7 PSI    | -3420 FT   | 36.6 PSI    | -3420 FT   |
|             | -18.46 °F  |            | -18.40 °F   |            | -18.40 °F   |            |
|             | MEAN       | OSC        | MEAN        | OSC        | MEAN        | OSC        |
| MR CH 192   | 2362.05    | 10342.30   | 11796.98    | 16547.69   | 6479.34     | 13100.25   |
| MR BM 192   | 1346.67    | 5258.41    | -1859.68    | 3911.75    | -2372.70    | 3719.37    |
| MR CH 150   | -8720.16   | 11834.60   | 8867.08     | 18207.08   | 58592.30    | 18207.08   |
| MR BM 150   | 4566.37    | 2632.38    | 3653.10     | 2632.38    | 3384.49     | 3062.15    |
| MR BM 35    | -61441.40  | 9080.01    | 40557.38    | 11804.01   | 52664.06    | 10593.34   |
| DRAG BRACE  | 7074.00    | 1273.32    | 6154.38     | 1980.72    | 5164.02     | 1839.24    |
| SCISR LK    | 233.14     | 110.21     | 110.21      | 122.93     | 67.82       | 80.54      |
| LONG TUBE   | 126.63     | 202.61     | 0           | 177.28     | 25.33       | 227.93     |
| LAT TUBE    | 116.36     | 193.94     | 155.15      | 258.58     | 103.43      | 181.01     |
| COLL TUBE   | 306.31     | 80.44      | 74.26       | 95.91      | 12.38       | 74.26      |
| TR CH 11    | -          | -          | -           | -          | -           | -          |
| TR BM 11    | -          | -          | -           | -          | -           | -          |
| TR CH 21.5  | -707.06    | 1042.18    | 1551.86     | 1169.80    | 556.22      | 872.03     |
| TR BM 21.5  | -293.65    | 364.13     | 334.76      | 240.79     | 370.00      | 381.74     |
| TR SFT TRQ  | 1171.63    | 376.60     | 2719.86     | 864.78     | 2566.43     | 711.35     |
| CG LONG ACC | .081/.068  |            | .093/.089   |            | .097/.076   |            |
| CG LAT ACC  | .017/.011  |            | -.006/-.020 |            | .003/-.037  |            |
| CG VRT ACC  | .963/.926  |            | .963/1.074  |            | 1.580/1.639 |            |



FLIGHT 30, 9500-LB., FWD C.G.

|             | LEFT HOVERING TURN |            | RIGHT HOVERING TURN |            | VERTICAL TAKEOFF |            |
|-------------|--------------------|------------|---------------------|------------|------------------|------------|
|             | 0 KTS              | 291.14 RPM | 0 KTS               | 320.83 RPM | 0 KTS            | 319.38 RPM |
|             | 38.2 PSI           | -3420 FT   | 38.0 PSI            | -3420 FT   | 44.0 PSI         | -3420 FT   |
|             | -18.40 °F          |            | -18.40 °F           |            | -18.40 °F        |            |
| PARAMETER   | MEAN               | OSC        | MEAN                | OSC        | MEAN             | OSC        |
| MR CH 192   | 226151.74          | 15858.20   | 5892.96             | 16547.69   | 3711.75          | 18616.15   |
| MR BM 192   | -2180.32           | 4617.14    | -1603.18            | 4360.64    | -3013.97         | 4937.78    |
| MR CH 150   | 72643.31           | 21848.50   | 6617.96             | 18207.08   | 982.16           | 30041.68   |
| MR BM 150   | 3653.10            | 3008.43    | 3814.26             | 2793.54    | 3008.43          | 3223.32    |
| MR BM 35    | 32385.37           | 12106.68   | 43584.05            | 10290.68   | 54782.73         | 12712.01   |
| DRAG BRACE  | 5659.20            | 1344.06    | 5588.46             | 1414.80    | 5305.50          | 3678.48    |
| SCISR LK    | 89.02              | 84.78      | 84.78               | 80.54      | 89.02            | 105.98     |
| LONG TUBE   | 88.64              | 177.28     | 75.98               | 227.93     | 139.29           | 253.26     |
| LAT TUBE    | 116.36             | 193.94     | 116.36              | 168.08     | 142.22           | 271.51     |
| COLL TUBE   | 74.26              | 83.54      | 64.97               | 61.88      | 64.97            | 80.44      |
| TR CH 11    | -                  | -          | -                   | -          | -                | -          |
| TR BM 11    | -                  | -          | -                   | -          | -                | -          |
| TR CH 21.5  | 2208.30            | 1020.91    | 8.54                | 723.15     | 1345.84          | 1127.26    |
| TR BM 21.5  | 422.86             | 411.11     | 240.79              | 276.03     | 869.20           | 381.74     |
| TR SFT TRQ  | 3291.73            | 864.78     | 2566.43             | 795.04     | 3738.06          | 1046.10    |
| CG LONG ACC | .097/.076          |            | .097/.085           |            | .089/.036        |            |
| CG LAT ACC  | -.014              |            | .008/- .014         |            | .042/- .048      |            |
| CG VRT ACC  | .970/1.083         |            | .956/1.067          |            | 1.149/.970       |            |

FLIGHT 30, 9500-LB., FWD C.G.

|             | HOVER TO FULL POWER CLIMB |            | FULL POWER CLIMB |            | LEVEL FLIGHT |            |
|-------------|---------------------------|------------|------------------|------------|--------------|------------|
|             | 0 KTS                     | 320.11 RPM | 48.0 KTS         | 319.75 RPM | 68.7 KTS     | 320.90 RPM |
|             | 49.1 PSI                  | -3420 FT   | 47.0 PSI         | -3458 FT   | 29.2 PSI     | 1364 FT    |
|             | -18.40 °F                 |            | -19.23 °F        |            | -34.94 °F    |            |
| PARAMETER   | MEAN                      | OSC        | MEAN             | OSC        | MEAN         | OSC        |
| MR CH 192   | 10312.62                  | 27579.48   | 8729.44          | 24821.53   | -10059.90    | 51022.04   |
| MR BM 192   | -1795.56                  | 7759.37    | -4745.40         | 9875.56    | -5130.16     | 9939.68    |
| MR CH 150   | -761.67                   | 40965.93   | -811.55          | 37324.51   | 77.65        | 63724.78   |
| MR BM 150   | 1620.09                   | 5425.92    | 3330.76          | 7252.47    | 2686.10      | 9455.07    |
| MR BM 35    | 58717.40                  | 16949.35   | 66284.07         | 22700.02   | 43281.38     | 22397.36   |
| DRAG BRACE  | 5305.50                   | 6154.38    | 4951.80          | 6225.12    | 6861.78      | 6649.56    |
| SCISR LK    | 84.78                     | 457.81     | 89.02            | 576.50     | 55.11        | 373.03     |
| LONG TUBE   | 278.59                    | 506.52     | 468.53           | 823.10     | 189.94       | 519.18     |
| LAT TUBE    | 38.79                     | 711.10     | 142.22           | 374.94     | 12.93        | 323.22     |
| COLL TUBE   | 68.07                     | 117.57     | 21.66            | 194.92     | 0            | 293.93     |
| TR CH 11    | -                         | -          | -                | -          | -            | -          |
| TR BM 11    | -                         | -          | -                | -          | -            | -          |
| TR CH 21.5  | 272.78                    | 1382.48    | 107.09           | 1020.91    | -315.50      | 1148.53    |
| TR BM 21.5  | 575.55                    | 469.84     | 352.38           | 587.30     | -58.73       | 440.48     |
| TR SFT TRQ  | 3180.14                   | 474.23     | 2036.41          | 613.71     | 1311.11      | 502.13     |
| CG LONG ACC | .125/.097                 |            | .048/.036        |            | 0            |            |
| CG LAT ACC  | 0/- .025                  |            | .003             |            | 0            |            |
| CG VRT ACC  | .956/.993                 |            | .985/.963        |            | 1.000        |            |

FLIGHT 30, 9500-LB., FWD C.G.

| PARAMETER   | LEFT TURN  |            | RIGHT TURN |            | S-TURN    |            |
|-------------|------------|------------|------------|------------|-----------|------------|
|             | 66.5 KTS   | 321.88 RPM | 65.5 KTS   | 321.88 RPM | 66.3 KTS  | 321.50 RPM |
|             | 29.2 PSI   | 1315 FT    | 30.3 PSI   | 1251 FT    | 29.24 PSI | 1334 FT    |
|             | -32.96 °F  |            | -33.78 °F  |            | -33.29 °F |            |
|             | MEAN       | OSC        | MEAN       | OSC        | MEAN      | OSC        |
| MR CH 192   | 8608.13    | 35163.84   | 5850.18    | 33784.86   | 5675.16   | 57916.91   |
| MR BM 192   | -4360.64   | 8144.13    | -4168.26   | 8400.64    | -5130.16  | 11158.10   |
| MR CH 150   | -454.84    | 54621.24   | 455.51     | 54621.24   | -5003.64  | 85573.28   |
| MR BM 150   | 2524.93    | 8434.35    | 3062.15    | 7682.25    | 3277.04   | 9723.68    |
| MR BM 35    | 39952.04   | 19370.69   | 42070.71   | 18462.69   | 58112.06  | 29964.03   |
| DRAG BRACE  | 6366.60    | 6366.60    | 6154.38    | 5871.42    | 6506.08   | 7852.14    |
| SCISR LK    | 254.34     | 326.40     | 42.39      | 351.84     | 59.35     | 491.72     |
| LONG TUBE   | 227.93     | 569.84     | 189.94     | 633.15     | 151.96    | 595.16     |
| LAT TUBE    | 51.72      | 387.87     | 103.43     | 400.80     | -37.99    | 379.89     |
| COLL TUBE   | 15.47      | 253.71     | -24.75     | 253.71     | 21.66     | 420.78     |
| TR CH 11    | -          | -          | -          | -          | -         | -          |
| TR BM 11    | -          | -          | -          | -          | -         | -          |
| TR CH 21.5  | -577.29    | 999.64     | -704.90    | 893.30     | -741.40   | 1020.91    |
| TR BM 21.5  | -58.73     | 510.95     | -52.86     | 493.33     | -76.35    | 557.94     |
| TR SFT TRQ  | 1227.42    | 641.61     | 1213.48    | 474.23     | 1129.79   | 641.61     |
| CG LONG ACC | -.032/.008 |            | 0/- .008   |            | 0/- .016  |            |
| CG LAT ACC  | -.006      |            | -.003      |            | -.017     |            |
| CG VRT ACC  | .963/1.000 |            | .985/1.000 |            | .956/.914 |            |

FLIGHT 30, 9500-LB., FWD C.G.

| PARAMETER   | LEFT SIDESLIP |            | RIGHT SIDESLIP |            | CYCLIC PULL-UP |            |
|-------------|---------------|------------|----------------|------------|----------------|------------|
|             | 66.5 KTS      | 322.22 RPM | 67.5 KTS       | 322.20 RPM | 31.5 KTS       | 321.86 RPM |
|             | 28.6 PSI      | 1085 FT    | 27.7 PSI       | 1078 FT    | 28.6 PSI       | 1224 FT    |
|             | -36.59 °F     |            | -37.42 °F      |            | -36.26 °F      |            |
|             | MEAN          | OSC        | MEAN           | OSC        | MEAN           | OSC        |
| MR CH 192   | 10215.21      | 45506.14   | 6105.44        | 40679.73   | 7256.27        | 41369.22   |
| MR BM 192   | -4488.89      | 9298.42    | -4296.51       | 8272.38    | -3206.35       | 10132.07   |
| MR CH 150   | -1272.94      | 63724.78   | -9418.00       | 53710.69   | -5868.86       | 65545.49   |
| MR BM 150   | 2686.10       | 9293.91    | 2847.27        | 8917.85    | 3277.04        | 6876.42    |
| MR BM 35    | 41465.38      | 23910.69   | 45097.38       | 22094.69   | 32990.70       | 19370.69   |
| DRAG BRACE  | 6649.56       | 6649.56    | 6720.30        | 6720.30    | 6295.86        | 6861.78    |
| SCISR LK    | 46.63         | 394.23     | 33.91          | 360.32     | 110.21         | 305.21     |
| LONG TUBE   | 240.60        | 506.52     | 240.60         | 633.15     | -392.55        | 696.46     |
| LAT TUBE    | 25.86         | 362.01     | 12.93          | 284.44     | 77.57          | 387.87     |
| COLL TUBE   | 18.56         | 275.37     | 27.85          | 219.67     | 49.50          | 148.51     |
| TR CH 11    | -             | -          | -              | -          | -              | -          |
| TR BM 11    | -             | -          | -              | -          | -              | -          |
| TR CH 21.5  | -984.59       | 1233.60    | -430.16        | 765.68     | -554.58        | 935.84     |
| TR BM 21.5  | -135.08       | 546.19     | 117.46         | 416.98     | 170.32         | 317.14     |
| TR SFT TRQ  | 711.35        | 446.34     | 2064.30        | 432.39     | 2106.15        | 557.92     |
| CG LONG ACC | .020/- .020   |            | .016/0         |            | .052/.032      |            |
| CG LAT ACC  | -.034         |            | .022           |            | .003           |            |
| CG VRT ACC  | .963/1.037    |            | .956/1.000     |            | 1.111/.874     |            |

FLIGHT 30, 9500-LB., FWD C.G.

| PARAMETER   | COLLECTIVE PULL-UP |            | LEVEL FLIGHT |            | LEVEL FLIGHT |            |
|-------------|--------------------|------------|--------------|------------|--------------|------------|
|             | MEAN               | OSC        | MEAN         | OSC        | MEAN         | OSC        |
|             | 65.8 KTS           | 319.33 RPM | 78.6 KTS     | 321.09 RPM | 88.7 KTS     | 320.02 RPM |
|             | 41.7 PSI           | 1004 FT    | 32.5 PSI     | 1109 FT    | 37.0 PSI     | 1109 FT    |
|             | -36.92 °F          |            | -36.26 °F    |            | -36.26 °F    |            |
| MR CH 192   | 9984.41            | 24132.04   | 6230.82      | 40679.73   | 13191.93     | 35853.32   |
| MR BM 192   | -4360.64           | 9298.42    | -4745.40     | 11093.97   | -4553.02     | 11863.50   |
| MR CH 150   | -2539.94           | 40965.93   | 1288.36      | 56441.95   | 4915.67      | 56441.95   |
| MR BM 150   | 3599.37            | 7145.03    | 2471.21      | 9884.85    | 2202.60      | 12570.95   |
| MR BM 35    | 53269.39           | 21186.69   | 40557.38     | 24213.36   | 39649.38     | 26332.03   |
| DRAG BRACE  | 5022.54            | 6083.64    | 5942.16      | 7144.74    | 5305.50      | 6932.52    |
| SCISR LK    | -38.15             | 453.57     | -4.24        | 381.51     | 46.63        | 381.51     |
| LONG TUBE   | 316.58             | 633.15     | 227.93       | 506.52     | 329.24       | 569.84     |
| LAT TUBE    | 25.86              | 413.73     | 0            | 323.23     | 103.43       | 633.52     |
| COLL TUBE   | -52.60             | 238.24     | 3.09         | 262.99     | -9.28        | 185.64     |
| TR CH 11    | -                  | -          | -            | -          | -            | -          |
| TR BM 11    | -                  | -          | -            | -          | -            | -          |
| TR CH 21.5  | -671.14            | 1042.18    | -577.98      | 680.61     | 23.99        | 914.57     |
| TR BM 21.5  | 340.63             | 522.7      | 23.49        | 581.4      | 140.95       | 552.06     |
| TR SFT TRQ  | 2022.46            | 809.0      | 1269.27      | 669.5      | 1339.01      | 516.08     |
| CG LONG ACC | .028/.016          |            | 0/- .020     |            | -.004/- .032 |            |
| CG LAT ACC  | .014               |            | -.006        |            | -.011        |            |
| CG VRT ACC  | 1.817/1.743        |            | .963/1.007   |            | 1.000        |            |

FLIGHT 30, 9500-LB., FWD C.G.

| PARAMETER   | POWER TO AUTO |            | STEADY AUTO |            | POWER RECOVERY ICE |            |
|-------------|---------------|------------|-------------|------------|--------------------|------------|
|             | MEAN          | OSC        | MEAN        | OSC        | MEAN               | OSC        |
|             | 84.7 KTS      | 329.31 RPM | 74.6 KTS    | 321.84 RPM | 49.5 KTS           | 321.14 RPM |
|             | 8.5 PSI       | -3666 FT   | 2.7 PSI     | -4062 FT   | 3.0 PSI            | -4287 FT   |
|             | -29.65 °F     |            | -29.48 °F   |            | -29.48 °F          |            |
| MR CH 192   | 7377.63       | 29647.94   | 5214.93     | 21374.10   | -2800.17           | 75843.57   |
| MR BM 192   | -4553.02      | 8272.38    | -5001.91    | 7310.48    | -2885.72           | 17955.56   |
| MR CH 150   | -3965.81      | 53710.89   | -16745.02   | 35503.81   | -1054.86           | 140194.52  |
| MR BM 150   | 0             | 9132.74    | 590.94      | 8058.30    | 3438.21            | 13967.72   |
| MR BM 35    | 13620.02      | 14830.68   | 31477.37    | 19673.36   | 47518.72           | 45702.72   |
| DRAG BRACE  | 9125.46       | 6366.60    | 9266.94     | 4810.32    | 6366.60            | 9054.72    |
| SCISR LK    | 262.82        | 453.57     | 284.01      | 389.99     | 46.63              | 440.86     |
| LONG TUBE   | 265.92        | 557.17     | 240.60      | 468.53     | 189.94             | 709.13     |
| LAT TUBE    | -12.93        | 555.95     | 51.72       | 543.02     | 90.50              | 840.38     |
| COLL TUBE   | 405.31        | 256.80     | 343.43      | 228.96     | 123.76             | 232.05     |
| TR CH 11    | -             | -          | -           | -          | -                  | -          |
| TR BM 11    | -             | -          | -           | -          | -                  | -          |
| TR CH 21.5  | -692.38       | 1744.06    | -1063.60    | 808.22     | -460.33            | 1637.71    |
| TR BM 21.5  | -916.19       | 375.87     | -822.22     | 205.56     | -428.73            | 563.81     |
| TR SFT TRQ  | 599.76        | 739.24     | 432.39      | 530.02     | 613.71             | 1227.42    |
| CG LONG ACC | -.004/- .044  |            | -.020       |            | .008/- .012        |            |
| CG LAT ACC  | .014/- .017   |            | -.197       |            | -.011/- .048       |            |
| CG VRT ACC  | 1.253/.978    |            | .911        |            | .926/.874          |            |

FLIGHT 30, 9500-LB., FWD C.G.

LANDING

IGE HOVER

0 KTS 325.57 RPM 0 KTS 321.09 RPM  
37.1 PSI -3420 FT 36.3 PSI -3420 FT  
-18.40 °F -18.40 °F

| PARAMETER   | MEAN        | OSC      | MEAN        | OSC      |
|-------------|-------------|----------|-------------|----------|
| MR CH 192   | 13227.50    | 47574.60 | 7609.79     | 20684.61 |
| MR BM 192   | -128.25     | 8913.65  | -2180.32    | 4424.76  |
| MR CH 150   | -3007.86    | 71007.61 | 49758.60    | 22758.85 |
| MR BM 150   | 3115.88     | 6339.20  | 3599.37     | 3223.32  |
| MR BM 35    | -302.67     | 25726.70 | 38438.71    | 15133.35 |
| DRAG BRACE  | 5800.68     | 5234.76  | 5588.46     | 1627.02  |
| SCISR LK    | 148.36      | 309.45   | 93.26       | 114.45   |
| LONG TUBE   | -962.39     | 519.18   | 0           | 253.26   |
| LAT TUBE    | 245.65      | 517.16   | 129.29      | 206.86   |
| COLL TUBE   | 83.54       | 290.84   | 92.82       | 95.91    |
| TR CH 11    | -           | -        | -           | -        |
| TR BM 11    | -           | -        | -           | -        |
| TR CH 21.5  | -269.90     | 1254.87  | -52.63      | 935.84   |
| TR BM 21.5  | 323.02      | 440.48   | 276.03      | 246.67   |
| TR SFT TRQ  | 2315.37     | 836.88   | 2371.16     | 1032.15  |
| CG LONG ACC | .020/- .129 |          | .052/.093   |          |
| CG LAT ACC  | .031/- .054 |          | .003/- .011 |          |
| CG VRT ACC  | 1.044/.874  |          | .956/1.067  |          |

FLIGHT 31, 8500-LB., FWD C.G.

ROTOR START

FLAT PITCH

FLAT PITCH

0 KTS 236.00 RPM 0 KTS 248.28 RPM 0 KTS 326.28 RPM  
8.07 PSI -3420 FT 7.6 PSI -3420 FT 12.7 PSI -3420 FT  
-18.4 °F -18.4 °F -18.4 °F

| PARAMETER   | MEAN        | OSC      | MEAN         | OSC      | MEAN      | OSC      |
|-------------|-------------|----------|--------------|----------|-----------|----------|
| MR CH 192   | 5754.46     | 12334.00 | 14.79        | 12772.75 | -12677.96 | 18150.75 |
| MR BM 192   | 854.89      | 4876.02  | 1013.20      | 5952.55  | 715.57    | 4116.12  |
| MR CH 150   | -5153.86    | 13371.76 | 4.78         | 14326.89 | -9824.43  | 14326.89 |
| MR BM 150   | 3633.65     | 4274.88  | 3820.67      | 3366.47  | 4835.96   | 3206.16  |
| MR BM 35    | -49124.64   | 15230.13 | -53156.14    | 12243.83 | -57934.22 | 17917.80 |
| DRAG BRACE  | 3684.40     | 1068.48  | 4200.22      | 1326.38  | 7442.49   | 1473.76  |
| SCISR LK    | 105.98      | 201.35   | 114.45       | 220.43   | 241.62    | 211.95   |
| LONG TUBE   | 71.56       | 33.83    | 26.02        | 260.20   | 0         | 195.15   |
| LAT TUBE    | -12.93      | 206.88   | 25.86        | 323.25   | 12.93     | 258.60   |
| COLL TUBE   | 146.30      | 107.80   | 192.50       | 107.80   | 346.50    | 147.84   |
| TR CH 11    | -898.79     | 833.20   | 5.39         | 624.90   | -5241.08  | 208.30   |
| TR BM 11    | -           | -        | -            | -        | -         | -        |
| TR CH 21.5  | -1234.14    | 807.48   | -.67         | 807.48   | -42.35    | 717.76   |
| TR BM 21.5  | -266.66     | 318.84   | -260.86      | 330.43   | -365.21   | 423.18   |
| TR SET TRQ  | 646.59      | 1077.65  | 661.98       | 1400.94  | 1139.23   | 846.72   |
| CG LONG ACC | .060/- .048 |          | -.028/- .048 |          | -.072     |          |
| CG LAT ACC  | .096/.006   |          | .020         |          | .034/.028 |          |
| CG VRT ACC  | .889/.859   |          | .926         |          | .926/.914 |          |

FLIGHT 31, 8500-LB., FWD C.G.

| IGE HOVER   |          |            | IGE HOVER |          |            | LEFT SIDEWARD FLIGHT |          |            |
|-------------|----------|------------|-----------|----------|------------|----------------------|----------|------------|
|             | 0 KTS    | 322.56 RPM |           | 0 KTS    | 303.81 RPM |                      | 0 KTS    | 322.53 RPM |
|             | 37.7 PSI | -3420 FT   |           | 35.9 PSI | -3420 FT   |                      | 37.7 PSI | -3420 FT   |
|             | -18.4 °F |            |           | -18.4 °F |            |                      | -18.4 °F |            |
| PARAMETER   | MEAN     | OSC        | MEAN      | OSC      | MEAN       | OSC                  | MEAN     | OSC        |
| MR CH 192   | -1017.11 | 12772.75   | 1403.66   | 12100.50 | -3661.07   | 16806.25             |          |            |
| MR BM 192   | -1963.08 | 3492.88    | -2596.32  | 3102.92  | -1963.08   | 4179.45              |          |            |
| MR CH 150   | -2326.69 | 22923.02   | 3322.88   | 18147.39 | -5116.61   | 21967.90             |          |            |
| MR BM 150   | 3286.31  | 2725.24    | 2965.70   | 2938.98  | 3019.13    | 2938.98              |          |            |
| MR BM 35    | 35536.97 | 11049.31   | 49572.58  | 8361.64  | 37627.38   | 9854.79              |          |            |
| DRAG BRACE  | 6116.10  | 2358.02    | 5231.85   | 1694.82  | 5747.66    | 2136.95              |          |            |
| SCISR LK    | -76.30   | 148.36     | 55.11     | 101.74   | 84.78      | 139.89               |          |            |
| LONG TUBE   | -39.03   | 286.22     | -78.06    | 221.17   | -78.06     | 351.27               |          |            |
| LAT TUBE    | 12.93    | 271.53     | 116.37    | 142.23   | 51.72      | 219.81               |          |            |
| COLL TUBE   | 112.42   | 92.40      | 44.66     | 64.68    | 103.18     | 86.24                |          |            |
| TR CH 11    | -4551.29 | 208.30     | -1194.87  | 208.30   | -4545.75   | 208.30               |          |            |
| TR BM 11    | -        | -          | -         | -        | -          | -                    |          |            |
| TR CH 21.5  | -505.37  | 695.33     | -387.46   | 605.61   | -615.48    | 874.77               |          |            |
| TR BM 21.5  | 289.85   | 376.80     | 359.41    | 498.54   | 237.68     | 313.04               |          |            |
| TR SFT TRQ  | 3017.42  | 985.28     | 3002.02   | 1000.68  | 3155.98    | 677.38               |          |            |
| CG LONG ACC | .072     |            | .076/.052 |          | .072       |                      |          |            |
| CG LAT ACC  | -.036    |            | -.008     |          | .006/-.008 |                      |          |            |
| CG VRT ACC  | .963     |            | .978      |          | .963       |                      |          |            |

FLIGHT 31, 8500-LB., FWD C.G.

| RIGHT SIDEWARD FLIGHT |           |            | REARWARD FLIGHT |          |            | JUMP TAKEOFF |          |            |
|-----------------------|-----------|------------|-----------------|----------|------------|--------------|----------|------------|
|                       | 0 KTS     | 321.40 RPM |                 | 0 KTS    | 319.58 RPM |              | 0 KTS    | 320.80 RPM |
|                       | 38.0 PSI  | -3420 FT   |                 | 39.1 PSI | -3420 FT   |              | 43.3 PSI | -3420 FT   |
|                       | -18.4 °F  |            |                 | -18.4 °F |            |              | -18.4 °F |            |
| PARAMETER             | MEAN      | OSC        | MEAN            | OSC      | MEAN       | OSC          | MEAN     | OSC        |
| MR CH 192             | -4659.36  | 17478.50   | -1275.93        | 12100.50 | -402.68    | 23528.75     |          |            |
| MR BM 192             | 1646.45   | 5002.68    | -1709.78        | 3609.52  | -569.92    | 7915.62      |          |            |
| MR CH 150             | 585.49    | 30564.03   | 3221.64         | 19102.52 | -778.43    | 43935.80     |          |            |
| MR BM 150             | 3713.80   | 3419.90    | 3446.62         | 3526.78  | 5637.50    | 6038.27      |          |            |
| MR BM 35              | 35238.34  | 7465.75    | 37030.12        | 16424.65 | 54350.66   | 13736.98     |          |            |
| DRAG BRACE            | 5821.35   | 2284.33    | 5747.66         | 3021.21  | 5452.91    | 6189.79      |          |            |
| SCISR LK              | 97.50     | 76.30      | 97.50           | 190.76   | 89.02      | 377.27       |          |            |
| LONG TUBE             | 26.02     | 130.1      | -78.06          | 325.25   | 156.12     | 429.33       |          |            |
| LAT TUBE              | 12.93     | 168.09     | 51.72           | 297.39   | -103.44    | 439.62       |          |            |
| COLL TUBE             | 97.02     | 73.92      | 334.18          | 61.50    | 97.02      | 113.96       |          |            |
| TR CH 11              | -4337.81  | 208.30     | -4004.40        | 208.30   | -4227.68   | 208.30       |          |            |
| TR BM 11              | -         | -          | -               | -        | -          | -            |          |            |
| TR CH 21.5            | -404.12   | 874.77     | -415.58         | 1099.07  | 107.57     | 1390.66      |          |            |
| TR BM 21.5            | 365.21    | 405.79     | 544.92          | 336.23   | 226.08     | 481.15       |          |            |
| TR SFT TRQ            | 3325.32   | 923.70     | 3448.48         | 677.38   | 2986.63    | 585.01       |          |            |
| CG LONG ACC           | -.104     |            | .112/.044       |          | .132/.032  |              |          |            |
| CG LAT ACC            | .300/.258 |            | .006/-.036      |          | .300/.216  |              |          |            |
| CG VRT ACC            | .978      |            | 1.703           |          | 1.022/.874 |              |          |            |

FLIGHT 31, 8500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |            | POWER TO AUTO |            | STEADY AUTO |            |
|-------------|--------------|------------|---------------|------------|-------------|------------|
|             | 63.1 KTS     | 323.70 RPM | 67.1 KTS      | 325.97 RPM | 66.0 KTS    | 332.18 RPM |
|             | 27.5 PSI     | 1206 FT    | 7.1 PSI       | 815 FT     | 2.5 PSI     | 99 FT      |
|             | -36.74 °F    |            | -38.92 °F     |            | -41.43 °F   |            |
|             | MEAN         | OSC        | MEAN          | OSC        | MEAN        | OSC        |
| MR CH 192   | -6091.26     | 38318.25   | -779.14       | 36301.50   | -8934.87    | 22856.50   |
| MR BM 192   | -3926.15     | 8738.85    | -3989.48      | 6649.12    | -49330.18   | 5699.25    |
| MR CH 150   | -8063.17     | 61128.06   | -3305.69      | 57307.56   | -18283.02   | 37249.91   |
| MR BM 150   | 2965.70      | 7908.53    | 5049.70       | 7961.96    | 988.57      | 5984.83    |
| MR BM 35    | 38523.27     | 19410.95   | 15528.76      | 16424.65   | 14632.87    | 16126.02   |
| DRAG BRACE  | 6852.98      | 6337.17    | 8179.37       | 5526.60    | 10021.57    | 5010.78    |
| SCISR LK    | 12.72        | 288.25     | 207.71        | 254.34     | 305.21      | 233.14     |
| LONG TUBE   | 39.03        | 611.47     | -39.03        | 325.25     | 65.05       | 234.18     |
| LAT TUBE    | -51.72       | 323.25     | 25.86         | 400.83     | -64.65      | 271.56     |
| COLL TUBE   | 63.14        | 261.80     | 266.42        | 283.36     | 429.66      | 184.80     |
| TR CH 11    | -4761.84     | 208.30     | -5183.30      | 208.30     | -6351.36    | 208.30     |
| TR BM 11    | -            | -          | -             | -          | -           | -          |
| TR CH 21.5  | -1076.60     | 785.05     | -895.79       | 964.49     | -1192.51    | 1031.78    |
| TR BM 21.5  | -150.72      | 411.59     | -753.61       | 376.80     | -950.71     | 394.20     |
| TR SFT TRQ  | 1185.42      | 677.38     | 492.64        | 1000.68    | 508.04      | 1108.44    |
| CG LONG ACC | 0            |            | -.008         |            | -.020       |            |
| CG LAT ACC  | 0            |            | .006/- .008   |            | -.008       |            |
| CG VRT ACC  | 1.000        |            | 1.074/.926    |            | .963/.815   |            |

FLIGHT 31, 8500-LB., FWD C.G.

| PARAMETER   | AUTO TO POWER |            | POWER TO AUTO |            | AUTO TO POWER |            |
|-------------|---------------|------------|---------------|------------|---------------|------------|
|             | 74.9 KTS      | 322.87 RPM | 69.2 KTS      | 326.53 RPM | 59.2 KTS      | 322.53 RPM |
|             | 16.4 PSI      | - 244 FT   | 7.6 PSI       | 1022 FT    | 6.2 PSI       | 627 FT     |
|             | -40.59 °F     |            | -38.08 °F     |            | -38.42 °F     |            |
|             | MEAN          | OSC        | MEAN          | OSC        | MEAN          | OSC        |
| MR CH 192   | 4567.94       | 52435.50   | -956.61       | 38990.50   | 3061.43       | 49746.5    |
| MR BM 192   | -4812.70      | 10068.68   | -4052.80      | 8105.60    | 5192.65       | 8232.25    |
| MR CH 150   | -2150.94      | 83095.96   | -7595.16      | 56352.43   | -7981.99      | 81185.71   |
| MR BM 150   | 2858.83       | 9939.10    | 2217.59       | 7160.42    | 2324.47       | 8816.94    |
| MR BM 35    | 47780.80      | 24786.29   | 16126.02      | 14334.24   | 40912.31      | 19112.32   |
| DRAG BRACE  | 7442.49       | 7221.42    | 8031.99       | 5231.85    | 7958.30       | 6558.23    |
| SCISR LK    | 63.58         | 381.51     | 76.30         | 182.28     | 38.15         | 292.49     |
| LONG TUBE   | 156.12        | 546.42     | 52.04         | 312.24     | 91.07         | 494.38     |
| LAT TUBE    | -38.79        | 323.25     | -116.37       | 310.32     | -64.65        | 323.25     |
| COLL TUBE   | 109.34        | 354.2      | 133.98        | 243.32     | 75.46         | 255.64     |
| TR CH 11    | -4712.62      | 208.30     | -5287.74      | 208.30     | -4649.90      | 208.30     |
| TR BM 11    | -             | -          | -             | -          | -             | -          |
| TR CH 21.5  | -1423.70      | 1166.36    | -597.89       | 1121.50    | -548.19       | 964.49     |
| TR BM 21.5  | -324.63       | 434.78     | -614.48       | 417.38     | -521.73       | 318.84     |
| TR SFT TRQ  | 615.80        | 969.88     | 523.43        | 1416.34    | 754.36        | 1693.45    |
| CG LONG ACC | -.028/-.052   |            | -.008/- .028  |            | .012/- .008   |            |
| CG LAT ACC  | .006/- .022   |            | .006          |            | .006/- .022   |            |
| CG VRT ACC  | .904/.882     |            | 1.111/.852    |            | .963/.556     |            |

FLIGHT 31, 8500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |            | LEFT TURN |            | RIGHT TURN  |            |
|-------------|--------------|------------|-----------|------------|-------------|------------|
|             | 104.4 KTS    | 319.64 RPM | 106.7 KTS | 318.92 RPM | 108.0 KTS   | 318.96 RPM |
|             | 46.6 PSI     | 1302 FT    | 47.9 PSI  | 1099 FT    | 48.7 PSI    | 1073 FT    |
|             | -36.41 °F    |            | -37.41 °F |            | -36.41 °F   |            |
|             | MEAN         | OSC        | MEAN      | OSC        | MEAN        | OSC        |
| MR CH 192   | -20.17       | 45713.00   | -16430.46 | 47057.50   | 7711.38     | 42351.75   |
| MR BM 192   | -4052.80     | 14881.38   | -8168.92  | 15831.25   | -5635.92    | 15514.62   |
| MR CH 150   | 1162.39      | 85961.34   | 1999.08   | 84051.09   | 2853.92     | 82140.84   |
| MR BM 150   | 2858.83      | 14534.59   | 3232.88   | 14748.34   | 1683.23     | 15710.18   |
| MR BM 35    | 46884.91     | 37328.75   | 43002.72  | 38821.90   | 48676.69    | 39419.16   |
| DRAG BRACE  | 4863.41      | 9211.00    | 4823.41   | 9432.06    | 4642.34     | 9800.50    |
| SCISR LK    | -21.20       | 869.00     | -42.39    | 869.00     | -12.72      | 864.76     |
| LONG TUBE   | 351.27       | 884.68     | 286.22    | 910.70     | 182.14      | 897.69     |
| LAT TUBE    | -12.93       | 1461.09    | 25.86     | 1551.60    | 51.72       | 1603.32    |
| COLL TUBE   | 20.02        | 563.64     | 44.66     | 520.52     | 63.14       | 462.00     |
| TR CH 11    | -4119.53     | 208.30     | -3988.13  | 208.30     | -3995.42    | 208.30     |
| TR BM 11    | -            | -          | -         | -          | -           | -          |
| TR CH 21.5  | -1092.54     | 1570.10    | -1044.00  | 2220.57    | -934.55     | 1704.68    |
| TR BM 21.5  | 289.85       | 869.55     | 278.26    | 1101.43    | 371.01      | 1014.43    |
| TR SFT TRQ  | 1554.90      | 1077.65    | 1647.26   | 1200.81    | 2016.74     | 1354.76    |
| CG LONG ACC | -.040        |            | -.048     |            | -.028/-.048 |            |
| CG LAT ACC  | -.028        |            | -.022     |            | -.003       |            |
| CG VRT ACC  | .896         |            | .896      |            | .978        |            |

FLIGHT 31, 8500-LB., FWD C.G.

| PARAMETER   | S-TURN      |            | CYCLIC PULL-UP |            | COLLECTIVE PULL-UP |            |
|-------------|-------------|------------|----------------|------------|--------------------|------------|
|             | 106.7 KTS   | 317.51 RPM | 88.7 KTS       | 319.96 RPM | 84.9 KTS           | 320.33 RPM |
|             | 49.3 PSI    | 969 FT     | 46.1 PSI       | 1108 FT    | 44.9 PSI           | 856 FT     |
|             | -38.42 °F   |            | -38.08 °F      |            | -39.09 °F          |            |
|             | MEAN        | OSC        | MEAN           | OSC        | MEAN               | OSC        |
| MR CH 192   | 12545.53    | 49074.25   | 14965.63       | 36973.75   | 8364.81            | 42351.75   |
| MR BM 192   | -5319.30    | 12981.62   | -9625.40       | 17224.40   | -5445.95           | 11335.18   |
| MR CH 150   | 7406.05     | 95512.60   | 6094.66        | 187204.70  | 9947.64            | 54442.18   |
| MR BM 150   | 2965.70     | 16458.29   | 2751.95        | 16030.80   | 2377.90            | 11435.30   |
| MR BM 35    | 59427.37    | 46287.65   | 56441.07       | 46586.28   | 45093.13           | 27473.96   |
| DRAG BRACE  | 4863.41     | 10316.32   | 5600.29        | 10684.76   | 4863.41            | 6852.98    |
| SCISR LK    | 12.72       | 911.38     | -25.43         | 890.19     | -21.20             | 466.29     |
| LONG TUBE   | 156.12      | 1040.80    | 481.37         | 975.75     | 286.22             | 524.48     |
| LAT TUBE    | 77.58       | 1616.25    | 64.65          | 1370.58    | -51.72             | 400.83     |
| COLL TUBE   | 50.82       | 477.40     | 164.78         | 477.40     | -1.54              | 224.84     |
| TR CH 11    | -3731.67    | 208.30     | -4178.02       | 208.30     | -4141.57           | 308.30     |
| TR BM 11    | -           | -          | -              | -          | -                  | -          |
| TR CH 21.5  | -1151.17    | 1771.97    | -1316.01       | 1928.98    | -668.10            | 1457.95    |
| TR BM 21.5  | 307.24      | 1084.04    | 272.46         | 516.36     | 139.13             | 782.60     |
| TR SFT TRQ  | 1616.48     | 1970.56    | 1477.92        | 1200.81    | 1016.07            | 985.28     |
| CG LONG ACC | -.008/-.088 |            | .032/-.056     |            | -.008/-.028        |            |
| CG LAT ACC  | .006/-.054  |            | .006/-.036     |            | -.017/-.022        |            |
| CG VRT ACC  | .985/.837   |            | 1.104/.741     |            | .926/.867          |            |

FLIGHT 31, 8500-LB., FWD C.G.

| PARAMETER   | POWER TO AUTOROTATION |            | AUTO TO POWER |            | PARTIAL POWER DESCENT |            |
|-------------|-----------------------|------------|---------------|------------|-----------------------|------------|
|             | MEAN                  | OSC        | MEAN          | OSC        | MEAN                  | OSC        |
|             | 91.5 KTS              | 323.99 RPM | 96.9 KTS      | 322.12 RPM | 67.1 KTS              | 325.03 RPM |
|             | 13.6 PSI              | 884 FT     | 6.7 PSI       | 302 FT     | 14.2 PSI              | -2405 FT   |
|             | -39.09 °F             |            | -40.26 °F     |            | -35.40 °F             |            |
| MR CH 192   | -3838.55              | 34957.00   | 1658.44       | 40335.00   | 642.67                | 22856.50   |
| MR BM 192   | -4242.78              | 12221.72   | -5762.58      | 14881.38   | -4242.78              | 7029.08    |
| MR CH 150   | -3065.00              | 71634.45   | -1220.65      | 71634.45   | -3785.16              | 33429.41   |
| MR BM 150   | 3285.31               | 11755.92   | 2484.77       | 13359.00   | 1629.80               | 6839.81    |
| MR BM 35    | 21501.36              | 34291.76   | 31057.52      | 31654.78   | 28668.48              | 16126.02   |
| DRAG BRACE  | 7147.74               | 8768.87    | 7221.42       | 9505.75    | 8474.12               | 4568.66    |
| SCISR LK    | 148.36                | 347.60     | 84.78         | 665.52     | 161.08                | 194.99     |
| LONG TUBE   | 143.11                | 1040.80    | 271.53        | 1228.35    | 143.11                | 312.24     |
| LAT TUBE    | 77.58                 | 2495.99    | 271.53        | 1228.35    | 25.86                 | 271.53     |
| COLL TUBE   | 235.62                | 455.84     | 180.18        | 351.12     | 244.86                | 166.32     |
| TR CH 11    | -4815.52              | 208.30     | -4470.22      | 208.30     | -5008.43              | 208.30     |
| TR BM 11    | -                     | -          | -             | -          | -                     | -          |
| TR CH 21.5  | -1657.17              | 1166.36    | -1013.77      | 1413.09    | -1010.63              | 1099.07    |
| TR BM 21.5  | -771.00               | 521.73     | -655.06       | 544.92     | -544.92               | 371.01     |
| TR SFT TRQ  | 7235.56               | 1893.58    | 661.98        | 1724.24    | 1554.90               | 1016.07    |
| CG LONG ACC | .012/- .068           |            | -.048/- .088  |            | -.036                 |            |
| CG LAT ACC  | .006/- .022           |            | -.008/- .036  |            | -.003                 |            |
| CG VRT ACC  | 1.148/.889            |            | .889/.771     |            | .904                  |            |

FLIGHT 31, 8500-LB., FWD C.G.

| PARAMETER   | APPROACH    |            | LANDING     |            | ICE HOVER   |            |
|-------------|-------------|------------|-------------|------------|-------------|------------|
|             | MEAN        | OSC        | MEAN        | OSC        | MEAN        | OSC        |
|             | 0 KTS       | 322.87 RPM | 0 KTS       | 324.63 RPM | 0 KTS       | 322.10 RPM |
|             | 20.1 PSI    | -3420 FT   | 35.9 PSI    | -3420 FT   | 35.4 PSI    | -3420 FT   |
|             | -18.40 °F   |            | -18.40 °F   |            | -18.40 °F   |            |
| MR CH 192   | -6188.06    | 84703.50   | 1247.02     | 28916.75   | 17150.44    | 20167.50   |
| MR BM 192   | -3419.55    | 17287.72   | -1899.75    | 4116.12    | -2343.02    | 3926.15    |
| MR CH 150   | -2150.94    | 100288.23  | 2002.90     | 31519.16   | -88086.50   | 22923.02   |
| MR BM 150   | 4515.34     | 13091.82   | 3126.01     | 2938.98    | 3606.93     | 2671.80    |
| MR BM 35    | 35835.60    | 51961.62   | 6868.49     | 12542.46   | 28967.11    | 16424.65   |
| DRAG BRACE  | 6558.23     | 9284.69    | 6484.54     | 3315.96    | 5747.66     | 2063.26    |
| SCISR LK    | 135.65      | 818.13     | 93.26       | 233.14     | 42.39       | 110.21     |
| LONG TUBE   | 130.10      | 520.40     | -78.06      | 429.33     | -65.05      | 312.24     |
| LAT TUBE    | 103.44      | 465.48     | -64.65      | 310.32     | 38.79       | 193.95     |
| COLL TUBE   | 174.02      | 237.16     | 186.34      | 77.00      | 149.38      | 123.20     |
| TR CH 11    | -4608.47    | 208.30     | -4934.15    | 312.45     | -4466.54    | 208.30     |
| TR BM 11    | -           | -          | -           | -          | -           | -          |
| TR CH 21.5  | -661.08     | 1413.09    | -691.63     | 1188.79    | -160.06     | 986.92     |
| TR BM 21.5  | 463.76      | 440.57     | 0           | 295.65     | 301.44      | 289.85     |
| TR SFT TRQ  | 738.96      | 1139.23    | 2247.67     | 1354.76    | 3017.42     | 1108.44    |
| CG LONG ACC | .024/- .020 |            | .084/- .080 |            | .064        |            |
| CG LAT ACC  | -.008       |            | .034/- .064 |            | .022/- .006 |            |
| CG VRT ACC  | 1.000/.875  |            | .985/.845   |            | .963        |            |



FLIGHT 31, 8500-LB., FWD C.G.

IGE HOVER

0 KTS 306.70 RPM  
35.7 PSI -3420 FT  
-18.40 °F

| PARAMETER   | MEAN        | OSC      |
|-------------|-------------|----------|
| MR CH 192   | 2009.36     | 16134.00 |
| MR BM 192   | -2279.70    | 3799.50  |
| MR CH 150   | -685.78     | 22923.02 |
| MR BM 150   | 3179.44     | 2671.80  |
| MR BM 35    | 40613.68    | 11945.2  |
| DRAG BRACE  | 4937.10     | 1989.58  |
| SCISR LK    | 42.39       | 156.84   |
| LONG TUBE   | -104.08     | 299.23   |
| LAT TUBE    | -12.93      | 232.74   |
| COLL TUBE   | 81.62       | 73.92    |
| TR CH 11    | -1699.10    | 208.30   |
| TR BM 11    | -           | -        |
| TR CH 21.5  | -371.78     | 1121.50  |
| TR BM 21.5  | 394.20      | 307.24   |
| TR SFT TRQ  | 2755.70     | 1093.04  |
| CG LONG ACC | .060        |          |
| CG LAT ACC  | .028/- .003 |          |
| CG VRT ACC  | 1.000/.963  |          |

FLIGHT 32, 8500-LB., FWD C.G.

| FLAT PITCH |            | FLAT PITCH |            | FLAT PITCH |            |
|------------|------------|------------|------------|------------|------------|
| 0 KTS      | 247.00 RPM | 0 KTS      | 306.40 RPM | 0 KTS      | 312.03 RPM |
| 6.9 PSI    | -3470 FT   | 10.3 PSI   | -3470 FT   | 10.7 PSI   | -3470 FT   |
| -18.40 °F  |            | -18.40 °F  |            | -18.40 °F  |            |

| PARAMETER   | MEAN      | OSC      | MEAN      | OSC      | MEAN      | OSC      |
|-------------|-----------|----------|-----------|----------|-----------|----------|
| MR CH 192   | 3.40      | 10211.38 | 2390.14   | 9530.63  | 3021.21   | 14295.94 |
| MR BM 192   | 1583.25   | 6459.66  | 1836.57   | 3736.47  | 2343.21   | 3673.14  |
| MR CH 150   | 6.58      | 17854.68 | -20443.61 | 25372.44 | -26011.45 | 26312.16 |
| MR BM 150   | 3801.21   | 2715.15  | 4507.15   | 2063.51  | 4289.94   | 3258.18  |
| MR BM 35    | -53218.49 | 13468.19 | -58867.38 | 10405.85 | -58867.38 | 14865.50 |
| DRAG BRACE  | 848.88    | 1273.32  | -         | -        | -         | -        |
| SCISR LK    | 142.77    | 188.96   | 205.75    | 138.57   | 222.55    | 188.96   |
| LONG TUBE   | 89.82     | 255.64   | 256.64    | 205.31   | 128.32    | 256.64   |
| LAT TUBE    | 155.15    | 362.01   | 155.15    | 168.08   | 168.08    | 206.86   |
| COLL TUBE   | 177.02    | 137.34   | 271.63    | 106.82   | 302.15    | 152.60   |
| TR CH 11    | .12       | 489.29   | -1590.98  | 203.87   | -2536.88  | 203.87   |
| TR BM 11    | -         | -        | -         | -        | -         | -        |
| TR CH 21.5  | -35.73    | 1175.96  | -676.64   | 783.97   | -380.34   | 899.26   |
| TR BM 21.5  | -272.46   | 295.65   | -347.82   | 423.18   | -307.24   | 434.78   |
| TR SFT TRQ  | 563.75    | 1056.75  | 887.67    | 422.70   | 887.67    | 591.78   |
| CG LONG ACC | .072      |          | .076      |          | .076      |          |
| CG LAT ACC  | -.011     |          | -.014     |          | -.003     |          |
| CG VRT ACC  | 1.000     |          | .985      |          | .977      |          |

FLIGHT 32, 8500-LB., FWD C.G.

| PARAMETER   | FLAT PITCH |            | IGE HOVER |            | IGE HOVER |            |
|-------------|------------|------------|-----------|------------|-----------|------------|
|             | 0 KTS      | 321.10 RPM | 0 KTS     | 319.70 RPM | 0 KTS     | 305.40 RPM |
|             | 11.2 PSI   | -3470 FT   | 34.8 PSI  | -3470 FT   | 34.0 PSI  | -3470 FT   |
|             | -18.40 °F  |            | -18.40 °F |            | -18.40 °F |            |
|             | MEAN       | OSC        | MEAN      | OSC        | MEAN      | OSC        |
| MR CH 192   | -1242.39   | 14976.70   | 2742.10   | 13615.18   | 7118.02   | 14295.94   |
| MR BM 192   | 2279.88    | 4939.74    | -1013.28  | 3799.80    | -1013.28  | 3293.16    |
| MR CH 150   | -25655.30  | 11276.64   | -17341.59 | 17854.68   | -10460.96 | 28191.60   |
| MR BM 150   | 4452.85    | 2606.54    | 3584.00   | 2606.54    | 3584.00   | 2769.45    |
| MR BM 35    | -58570.07  | 13676.26   | 33893.34  | 8919.3     | 41623.40  | 8324.68    |
| DRAG BRACE  | 3324.78    | 1344.06    | 2334.42   | 1485.54    | 1697.76   | 2263.68    |
| SCISR LK    | 209.95     | 151.16     | 83.98     | 121.77     | 46.19     | 125.97     |
| LONG TUBE   | 141.15     | 359.30     | 0         | 243.81     | -12.832   | 230.98     |
| LAT TUBE    | 77.57      | 271.51     | 77.57     | 219.79     | 90.50     | 129.29     |
| COLL TUBE   | 317.41     | 119.03     | 109.87    | 61.04      | 54.94     | 70.20      |
| TR CH 11    | -4076.56   | 203.87     | -3751.31  | 203.87     | -1322.83  | 203.87     |
| TR BM 11    | -          | -          | -         | -          | -         | -          |
| TR CH 21.5  | -1016.36   | 876.20     | 411.71    | 853.15     | -184.01   | 807.03     |
| TR BM 21.5  | -301.44    | 434.78     | 278.26    | 231.88     | 388.40    | 231.88     |
| TR SFT TRQ  | 944.03     | 662.23     | 2465.75   | 563.60     | 2564.38   | 746.77     |
| CG LONG ACC | .068       |            | .088      |            | .088      |            |
| CG LAT ACC  | -.014      |            | -.014     |            | -.011     |            |
| CG VRT ACC  | .970       |            | .977      |            | 1.000     |            |

FLIGHT 32, 8500-LB., FWD C.G.

| PARAMETER   | LEFT HOVERING TURN |           | RIGHT HOVERING TURN |           | VERTICAL TAKEOFF |           |
|-------------|--------------------|-----------|---------------------|-----------|------------------|-----------|
|             | 0 KTS              | 319.3 RPM | 0 KTS               | 319.3 RPM | 0 KTS            | 319.3 RPM |
|             | 36.1 PSI           | 3470 FT   | 35.3 PSI            | -3470 FT  | 11.3 PSI         | -3470 FT  |
|             | -18.40 °F          |           | -18.40 °F           |           | -18.40 °F        |           |
|             | MEAN               | OSC       | MEAN                | OSC       | MEAN             | OSC       |
| MR CH 192   | 5337.83            | 19742.01  | -2150.52            | 21103.53  | 3295.55          | 30634.16  |
| MR BM 192   | -569.97            | 3166.50   | -1139.94            | 4813.08   | -1203.27         | 5256.39   |
| MR CH 150   | -14432.22          | 18794.40  | -21949.98           | 25372.44  | -16311.06        | 27251.88  |
| MR BM 150   | 3746.91            | 2878.06   | 3746.91             | 3584.00   | 4507.17          | 4941.57   |
| MR BM 35    | 33596.03           | 8324.68   | 34487.46            | 9210.61   | 49056.15         | 17243.98  |
| DRAG BRACE  | 2192.94            | 1768.5    | 1768.5              | 2829.6    | 1839.24          | 4739.58   |
| SCISR LK    | 117.57             | 117.57    | 121.77              | 180.56    | 79.78            | 327.52    |
| LONG TUBE   | 12.83              | 269.47    | -12.83              | 192.48    | 423.81           | 384.96    |
| LAT TUBE    | 116.36             | 206.86    | 51.72               | 210.30    | 142.22           | 374.94    |
| COLL TUBE   | 115.98             | 91.56     | 85.46               | 137.34    | 94.61            | 155.65    |
| TR CH 11    | -3681.85           | 203.87    | -3702.24            | 203.87    | -3661.46         | 203.87    |
| TR BM 11    | -                  | -         | -                   | -         | -                | -         |
| TR CH 21.5  | -708.77            | 714.80    | -731.83             | 645.62    | -247.61          | 1106.78   |
| TR BM 21.5  | 324.63             | 359.41    | 214.49              | 313.04    | 475.35           | 295.65    |
| TR SFT TRQ  | 2775.73            | 704.50    | 2395.30             | 873.58    | 3099.80          | 859.49    |
| CG LONG ACC | .088               |           | .092                |           | .084             |           |
| CG LAT ACC  | 0                  |           | -.006               |           | -.014            |           |
| CG VRT ACC  | .985               |           | 1.008               |           | .947             |           |

FLIGHT 32, 8500-LB., FWD C.G.

| HOVER TO FULL POWER CLIMB |           |          | FULL POWER CLIMB |           | LEVEL FLIGHT |           |
|---------------------------|-----------|----------|------------------|-----------|--------------|-----------|
| 0 KTS                     | 318.2 RPM |          | 72.7 KTS         | 318.9 RPM | 69.0 KTS     | 320.7 RPM |
| 35.2 PSI                  | -3470 FT  |          | 46.1 PSI         | -3308 FT  | 27.1 PSI     | 2997 FT   |
| -18.40 °F                 |           |          | -18.40 °F        |           | -13.00 °F    |           |
| PARAMETER                 | MEAN      | OSC      | MEAN             | OSC       | MEAN         | OSC       |
| MR CH 192                 | 4952.52   | 23145.81 | 7932.88          | 23826.56  | 1355.39      | 33357.19  |
| MR BM 192                 | -1773.24  | 5636.37  | -1836.57         | 9562.83   | -2976.51     | 8422.89   |
| MR CH 150                 | -13485.92 | 23493.00 | -13403.23        | 17854.68  | -19922.06    | 46986.00  |
| MR BM 150                 | 4344.24   | 3909.82  | 3475.39          | 8688.48   | 2280.73      | 8579.87   |
| MR BM 35                  | 51731.94  | 12487.02 | 51731.94         | 20514.39  | 36271.82     | 16946.67  |
| DRAG BRACE                | 1485.54   | 3537.00  | 1414.80          | 4102.92   | 3112.56      | 5022.54   |
| SCISR LK                  | 75.58     | 205.75   | 12.60            | 470.29    | 29.39        | 272.94    |
| LONG TUBE                 | 243.81    | 372.13   | 320.80           | 680.10    | 166.82       | 615.94    |
| LAT TUBE                  | 64.64     | 245.65   | 38.79            | 374.94    | 25.86        | 323.22    |
| COLL TUBE                 | 82.40     | 73.25    | 21.36            | 152.60    | 3.05         | 207.54    |
| TR CH 11                  | -3438.09  | 203.87   | -3559.02         | 203.87    | -3871.18     | 203.87    |
| TR BM 11                  | -         | -        | -                | -         | -            | -         |
| TR CH 21.5                | -665.96   | 783.97   | -906.98          | 945.38    | -1514.14     | 760.91    |
| TR BM 21.5                | 481.15    | 272.46   | 324.63           | 365.21    | -98.55       | 463.76    |
| TR SFT TRQ                | 3043.44   | 676.32   | 1845.79          | 704.50    | 1099.02      | 676.32    |
| CG LONG ACC               | .084      |          | .028             |           | 0            |           |
| CG LAT ACC                | -.014     | .        | 0                |           | 0            |           |
| CG VRT ACC                | .939      |          | .878             |           | 1.000        |           |

FLIGHT 32, 8500-LB., FWD C.G.

|             | LEFT TURN |           | RIGHT TURN |           | S-TURN       |           |
|-------------|-----------|-----------|------------|-----------|--------------|-----------|
|             | 69.2 KTS  | 321.1 RPM | 69.2 KTS   | 320.4 RPM | 72.5 KTS     | 320.4 RPM |
|             | 26.7 PSI  | 3031 FT   | 26.5 PSI   | 3171 FT   | 27.73 PSI    | 3090 FT   |
|             | -13.34 °F |           | -11.82 °F  |           | -12.67 °F    |           |
| PARAMETER   | MEAN      | OSC       | MEAN       | OSC       | MEAN         | OSC       |
| MR CH 192   | 119.13    | 36080.23  | 2452.77    | -1631.78  | 219885.16    | 674.63    |
| MR BM 192   | -3039.84  | 8802.87   | -3546.48   | 8866.20   | -3926.46     | 1096.13   |
| MR CH 150   | -21896.42 | 52624.32  | -19146.80  | -23845.40 | 386224.92    | -27439.82 |
| MR BM 150   | 2280.73   | 8688.48   | 2606.54    | 8688.48   | 2823.76      | 8905.69   |
| MR BM 35    | 35677.20  | 15460.12  | 38055.68   | 20217.08  | 49056.15     | 24379.42  |
| DRAG BRACE  | 3183.30   | 5517.72   | 3466.26    | 5588.46   | 3324.78      | 6791.04   |
| SCISR LK    | 33.59     | 260.34    | 12.60      | 285.53    | 92.38        | 398.90    |
| LONG TUBE   | 179.65    | 500.45    | 153.98     | 500.45    | 25.66        | 628.77    |
| LAT TUBE    | 25.86     | 387.87    | 25.86      | 323.22    | -12.93       | 387.87    |
| COLL TUBE   | 27.47     | 238.06    | 18.31      | 231.95    | 39.68        | 347.93    |
| TR CH 11    | -3940.79  | 203.87    | -3819.03   | -3819.03  | -            | -         |
| TR BM 11    | -         | -         | -          | -         | -            | -         |
| TR CH 21.5  | -1431.41  | 899.26    | -1489.75   | 922.32    | -1489.75     | 899.26    |
| TR BM 21.5  | -133.33   | 521.73    | -168.11    | 405.79    | -144.92      | 399.99    |
| TR SFT TRQ  | 760.86    | 676.32    | 901.76     | 690.41    | 1000.39      | 704.50    |
| CG LONG ACC | -.012     |           | -.032      |           | .020/- .024  |           |
| CG LAT ACC  | -.028     |           | -.017      |           | -.008/- .022 |           |
| CG VRT ACC  | .939      |           | .924       |           | 1.000/.875   |           |

FLIGHT 32, 8500-LB., FWD C.G.

| PARAMETER   | RIGHT SIDESLIP |          | CYCLIC PULL-UP |          | COLLECTIVE PULL-UP |          |
|-------------|----------------|----------|----------------|----------|--------------------|----------|
|             | MEAN           | OSC      | MEAN           | OSC      | MEAN               | OSC      |
| MR CH 192   | 1187.24        | 36760.99 | 2452.77        | 51056.92 | 3727.84            | 29272.64 |
| MR BM 192   | -2596.53       | 8549.55  | -2216.55       | 10829.43 | -1899.90           | 8802.87  |
| MR CH 150   | -24648.86      | 46046.28 | -21026.24      | 75177.6  | -20491.53          | 48865.44 |
| MR BM 150   | 2117.82        | 8416.96  | 3855.51        | 8416.96  | 3475.39            | 9177.21  |
| MR BM 35    | 37758.37       | 16946.67 | 41028.78       | 32109.48 | 46974.98           | 19622.46 |
| DRAG BRACE  | 3254.04        | 4173.66  | 2900.34        | 7074.00  | 2829.60            | 5729.94  |
| SCISR LK    | 41.99          | 260.34   | 33.59          | 344.32   | 41.99              | 407.30   |
| LONG TUBE   | 166.82         | 526.11   | 141.15         | 577.44   | 243.81             | 641.60   |
| LAT TUBE    | 38.79          | 284.44   | 25.86          | 439.59   | 0                  | 452.52   |
| COLL TUBE   | 18.31          | 228.90   | 45.78          | 210.59   | -6.10              | 225.85   |
| TR CH 11    | -4062.82       | 203.87   | -3819.05       | 203.87   | -3403.59           | 203.87   |
| TR BM 11    | -              | -        | -              | -        | -                  | -        |
| TR CH 21.5  | -1606.37       | 668.68   | -1373.19       | 1152.90  | -1351.40           | 968.44   |
| TR BM 21.5  | -34.78         | 376.80   | -34.78         | 382.60   | 92.75              | 579.7    |
| TR SFT TRQ  | 1690.80        | 535.42   | 1338.55        | 704.50   | 1084.93            | 704.50   |
| CG LONG ACC | .004           |          | .112/.040      |          | .060/.016          |          |
| CG LAT ACC  | .031           |          | -.008          |          | .031/-.003         |          |
| CG VRT ACC  | .985           |          | 1.152/.962     |          | 1.753/.886         |          |

FLIGHT 32, 8500-LB., FWD C.G.

| PARAMETER   | LEVEL FLIGHT |          | LEVEL FLIGHT |          | POWER TO AUTOROTATION |          |
|-------------|--------------|----------|--------------|----------|-----------------------|----------|
|             | MEAN         | OSC      | MEAN         | OSC      | MEAN                  | OSC      |
| MR CH 192   | 3814.29      | 31995.67 | 4529.09      | 37441.74 | 2876.21               | 41313.22 |
| MR BM 192   | -3736.47     | 10576.11 | -4179.78     | 12919.32 | -2976.51              | 9499.50  |
| MR CH 150   | -18207.08    | 42287.40 | -14342.95    | 57322.92 | -14399.33             | 58386.68 |
| MR BM 150   | 2389.33      | 10317.57 | 2117.82      | 13195.63 | 1248.97               | 10426.18 |
| MR BM 35    | 35974.51     | 18135.91 | 36569.13     | 33298.72 | 594.62                | 22892.87 |
| DRAG BRACE  | 2192.94      | 5942.16  | 2263.68      | 7074.00  | 4456.62               | 5517.72  |
| SCISR LK    | 37.79        | 344.32   | -8.40        | 512.29   | 310.73                | 390.51   |
| LONG TUBE   | 1013.73      | 577.44   | 320.80       | 718.59   | 513.28                | 564.61   |
| LAT TUBE    | 25.86        | 367.01   | 129.29       | 788.67   | 77.57                 | 905.03   |
| COLL TUBE   | 45.78        | 189.22   | 24.42        | 241.11   | 427.28                | 244.16   |
| TR CH 11    | -3819.03     | 203.87   | -3559.02     | 203.87   | -4448.05              | 451.29   |
| TR BM 11    | -            | -        | -            | -        | -                     | -        |
| TR CH 21.5  | -1572.14     | 1152.90  | -1720.33     | 1129.84  | -1644.83              | 1475.71  |
| TR BM 21.5  | 11.59        | 562.31   | 110.14       | 608.68   | -991.29               | 1014.81  |
| TR SFT TRQ  | 662.23       | 563.60   | 1042.66      | 915.85   | 450.88                | 2268.49  |
| CG LONG ACC | .012         |          | .004         |          | 0/- .072              |          |
| CG LAT ACC  | -.008        |          | -.008        |          | .037/.008             |          |
| CG VRT ACC  | .992         |          | .985         |          | 1.236/.954            |          |

FLIGHT 32, 8500-LB., FWD C.G.

| PARAMETER   | STEADY AUTOROTATION |            | POWER RECOVERY IGE |            | LANDING     |            |
|-------------|---------------------|------------|--------------------|------------|-------------|------------|
|             | MEAN                | OSC        | MEAN               | OSC        | MEAN        | OSC        |
|             | 50.8 KTS            | 294.90 RPM | 0 KTS              | 320.00 RPM | 0 KTS       | 323.60 RPM |
|             | 1.5 PSI             | -2737 FT   | 22.2 PSI           | -3470 FT   | 26.1 PSI    | -3470 FT   |
|             | -10.31 °F           |            | -18.40 °F          |            | -18.40 °F   |            |
| MR CH 192   | 284.56              | 27911.12   | 1394.86            | 80329.56   | 813.51      | 58545.27   |
| MR BM 192   | -3419.82            | 5509.71    | -2469.87           | 16529.13   | 569.97      | 12032.70   |
| MR CH 150   | -30331.34           | 28191.60   | -21812.78          | 107128.08  | -18723.92   | 65780.40   |
| MR BM 150   | 1683.39             | 4887.27    | 3312.48            | 12218.18   | 5810.42     | 8308.36    |
| MR BM 35    | 29136.38            | 26460.59   | 37758.37           | 56191.59   | -12189.71   | 27055.21   |
| DRA' BRACE  | 5164.02             | 3537.00    | 2900.34            | 9054.72    | 3112.56     | 10611.00   |
| SCISR LK    | 251.94              | 247.74     | 121.77             | 352.72     | 188.96      | 499.68     |
| LONG TUBE   | 141.15              | 372.13     | 51.33              | 538.94     | 38.50       | 744.26     |
| LAT TUBE    | 426.66              | 426.66     | 181.01             | 646.45     | 271.51      | 413.73     |
| COLL TUBE   | 372.34              | 128.18     | 158.70             | 219.74     | 161.76      | 225.85     |
| TR CH 11    | -3749.58            | 203.87     | -4377.81           | 203.87     | -3955.73    | 203.87     |
| TR BM 11    | -                   | -          | -                  | -          | -           | -          |
| TR CH 21.5  | -2291.23            | 1129.84    | -996.10            | 1383.48    | -1013.24    | 1037.61    |
| TR BM 21.5  | 576.30              | 399.99     | -278.26            | 469.56     | -173.91     | 226.08     |
| TR SFT TRQ  | -2324.85            | 732.68     | 1197.65            | 986.30     | 450.88      | 1394.91    |
| CG LONG ACC | .028                |            | .048/0             |            | .088/- .129 |            |
| CG LAT ACC  | .022/.008           |            | .017/- .042        |            | .048/- .056 |            |
| CG VRT ACC  | .992/.833           |            | 2.172/1.038        |            | 1.282/.688  |            |

FLIGHT 32, 8500-LB., FWD C.G.

| PARAMETER   | IGE HOVER |           |
|-------------|-----------|-----------|
|             | MEAN      | OSC       |
|             | 0 KTS     | 320.6 RPM |
|             | 33.0 PSI  | -3470 FT  |
|             | -18.40 °F |           |
| MR CH 192   | 222608.19 | 14976.70  |
| MR BM 192   | -696.63   | 3166.50   |
| MR CH 150   | 391863.24 | 16914.96  |
| MR BM 150   | 3692.60   | 2787.06   |
| MR BM 35    | 31217.55  | 8919.30   |
| DRAG BRACE  | 2263.68   | 1627.02   |
| SCISR LK    | 100.78    | 117.57    |
| LONG TUBE   | 115.49    | 218.14    |
| LAT TUBE    | 116.36    | 206.86    |
| COLL TUBE   | 19.03     | 73.25     |
| TR CH 11    | 23913.95  | 203.87    |
| TR BM 11    | -         | -         |
| TR CH 21.5  | -1160.14  | 807.03    |
| TR BM 21.5  | 127.53    | 231.88    |
| TR SFT TRQ  | 2338.94   | 760.86    |
| CG LONG ACC | .125/.096 |           |
| CG LAT ACC  | .034/.025 |           |
| CG VRT ACC  | .977/.924 |           |